

MY
WONDER-
STORY

BY
ANNE K. BENEDICT:

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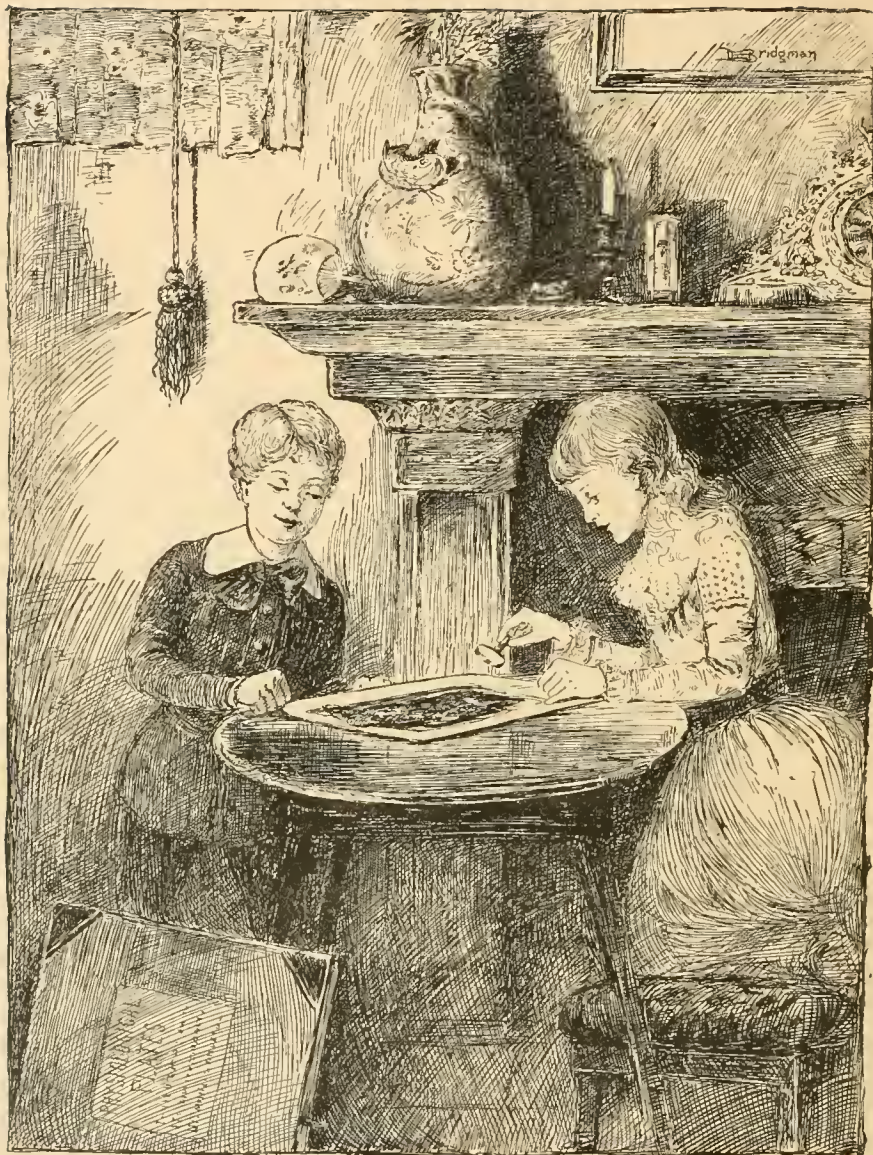
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FLORENCE STUDIES BONE STRUCTURE.

MY WONDER-STORY

BY

ANNE KENDRICK BENEDICT

" And Nature the old Nurse took
The child upon her knee,
Saying, ' Here is a story book
Thy Father has written for thee. ' "

BOSTON
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FRANKLIN AND HAWLEY STREETS

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MY WONDER-STORY

CHAPTER I.

HOW THE BONES ARE MADE.



It was a bright day in the spring-time: a day of open windows and chirping robins; a day of crocuses, and dandelions; even the violet had lifted its head toward the sunshine. The peach-trees gave their promise of a rich harvest. The apple-blossoms sent their perfume abroad, telling of the good things of the autumn. The cherry-trees were ready to scatter their shower, and it would take but a few weeks of such weather as this to swell and redden the fruit.

On a lawn outside of my window, Florence and

Jack, my children, had been playing. They had made daisy chains, romped with Fido, and raked pretty stones from the gravel walk until they were tired. Coming to the window, they called both at a time, not as well-trained children ought:

“Mamma! mamma! isn’t it eleven o’clock?”

Eleven o’clock meant a lunch of crackers and apples, and, on this particular day of the week, a story from mamma. I looked at the clock. Yes! they had guessed right. The hour hand had found its way to XI., the minute hand to XII., and it was eleven o’clock. I rang for the lunch. With faces washed and hats put away, they were soon eating it. It was not elaborate, and the long romp had made them hungry, so very soon they were seated by me with expectant eyes and ears, waiting for the story. Listen, and you shall hear it, too.

“Far away, in a country that was very beautiful, in a home that had about it everything that was lovely, there lived, a long time ago, a great King. We do not know how he looked, or even what form he had. We know three things about him:

He was very powerful, perfectly good, and he had a great heart full of love. He had lived in this home many years. His powerful mind had thought and thought a great deal until he had created many worlds, that were whirling around in the air. He had hung in the heavens thousands and tens of thousands of beautiful lamps lighted by blazing suns. In the most simple ways he had given to these worlds power by which they could whirl, and hang there and be blazing forever. But He wanted something to love. He could not love the blazing suns, the lovely stars. They had no hearts with which to love him in return, so he said:

“‘I will make a form, the most wonderful of anything that I have yet made. I will breathe into it a part of my own life. It shall have power that my suns and my worlds know nothing of. It shall be perfect in every part. Yet every part shall be needed to make the whole. It shall be good, as I am good; it shall love as I can love; I will make it worthy of my love, and I will love it forever.’

“Do you know who is this great King? It is God, our Father. Do you know what this wonderful form is? It is your body and mine. Do you know what dwells in this wonderful form? Your soul and mine. But now, how much do you know about this wonderful body that God has placed your soul in, and given you to take care of? You run and jump and play. You move your heads and arms and hands and eyes and noses”—

“Mamma, I can't make my ears go,” piped out little Jack.

“And yet I don't believe you have ever thought what a strange creature you are.”

Here we all had to stop and try to move our ears for Jack's benefit. But he was right. They wouldn't go. I then went on:

“Jack loves to get the bees and bugs and pull them to pieces. Florence likes to see what flowers are made of, and poke her dollies in the ribs to see what they are stuffed with. She loves to break their wax heads to see the eyes open and shut. But if I let you into the secrets of your bodies you

will find out things so much more wonderful, that I am afraid you will cut off your hands and arms and heads to see if these things are true. But if you will promise me never even to stick a pin into your arms to see the blood run, I will tell you something of all these things."

They both laughed, and promised.

"And where shall we begin? At the bottom, or the top, or in the middle? I am afraid that if we began at the feet the head might not like it, and if we began at the head the feet might do that naughty thing they never were meant to do. I think we will start somewhere in the middle."

I touched the bell, and Mary came in, bringing on a platter a beefsteak, raw. Jack and Florence looked first at Mary and then at me.

I knew they were thinking, "Is mamma going to give us raw beef to eat?"

Jack spoke out.

"Mamma, what is that for?" he said.

"You wait and see, my boy," I answered.

Jack did not love to wait, and I know that if he

had had time to stop wondering in his little mind, his lips would have formed themselves into a pout, and he would have said:

"I don't want to know at all, if I have to wait. Florence, too, has her weaknesses. But she is a great comfort at such a time, when she sits quiet and demure, and after thinking it out as far as she can, she says, in a wise tone:

"'Jack, don't you see? Mamma is going to show us what our flesh and blood and bones are like.'"

"That's almost right, little girl," I answered; "but we can't say much about flesh and blood to-day. There is so much to say about that last thing you spoke about. What was it?"

"Bone," said Jack.

"That's right."

"Mary, move the stand near me and put the platter on it. Now, little witches, come up close, and we will find what this beefsteak is for."

"Do you both see in the centre a large round bone?" They both saw it. "Well, if your bones and mine were sawed off, that is just the way the

in that one piece of bone. These were all filled with soft material like fat.

"What is that thing that looks like fat, mamma?" asked Jack.

"Listen, chickies, while I read, and you will find out what it is."

"Bones are made of three things. First, fiber. This is a stringy kind of material that will bend, but is so tough that you can hardly break it, or even cut it. Fiber is put in so as to make the bones."

"O, mamma! I know! I know!" said Florence, "please let me tell! I thought" —

"Go on," I said.

"It makes them so they can bend a little and won't break. They have to do that because we wiggle so much."

We laughed, and I told Florence she was right.

"You can't see it in the bone," said Jack.

"No! Not so as to tell what it is. It is part of that material in the little holes. The kind that looks like fat."

"What's the other part?" said Florence.

"The other part is cartilage, or gristle."

"O, yes! I know what that is," said Jack; "I've seen it lots of times in chickens. I like to eat it sometimes."

"But you can't see that, either," said Florence.

"No, not unless you have a very large glass. Some bones are fixed so that the different parts show more plainly. The fiber and the cartilage are called the animal matter of the bones, because these kinds of matter are found only in animals."

"Are people animals?" asked Jack.

"Yes; they have animal bodies."

"Why are the bones fixed that way, mamma?" asked Jack.

"Let us think," said Florence.

"O, dear! I can't think," said Jack. "I tried."

Jack has a funny mind. He can think nicely, but it must be, pop! all in a minute. I guess he had spent about half a minute on that question. But he knew he could never find it out. Even Florence had to give it up.

"Think, my little ones, if the frame that is inside of us were all made of lime, or material like that, how heavy it would be to carry about all the time."

"The cartilage and fiber make it lighter, don't they?" said Florence.

"Yes; but that isn't all."

"The bone would be softer," Jack said, "and when we bump our legs it would press in, and wouldn't break."

"Exactly, my boy. Babies' bones are almost all cartilage, because the little things are so helpless that their bones would be very apt to be broken if they were hard. When we grow older, to be little boys and girls, and older boys and girls, there is more fiber in the bones, because we have to jump and hop and run, and our bones need to be very tough. When we grow to be men and women, our bones have more earthy matter and become harder, because we don't fly about so much and so fast. Old people have bones made almost entirely of earthy matter. Their bones break very easily."

"Yes," said Florence, "Grandma Blake broke her arm when she fell about five steps, didn't she?"

"And I tumbled all the way down the very next day, didn't I?" said Jack, "and only bumped my head."

"Yes."

"Mamma, I think that 'great King' is very wonderful, don't you?" said Florence thoughtfully.

"Yes," I answered. "Do not forget the 'great King' for one moment while you are studying about your bodies. You can never see his power more plainly."

"The outside of the bones is always harder than the inside. If you look closely at the one we have here you will see around the edge a rim of the earthy matter, and more of the holes filled with animal matter inside. We could easily see it. Some of the long bones are hollow inside, and are filled with marrow."

"Do we have marrow in us?" said Jack. "I love marrow."

"Mamma," said Florence, looking hard at our

beefsteak bone, "it seems to me that I can see something on the very outside of the bone."

"Yes; that is a covering that covers the whole bone on the outside. It has in it the little tubes that carry the blood to the bones."

"Do the bones have to have blood in them?" said Jack. "Why?"

"To make them grow. Everything in the body needs blood."

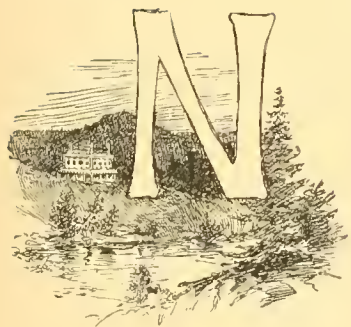
"Well, I never saw anything so funny as it all is, anyhow," said Jack.

"Yes, it's very, very strange. But your heads and mine are tired to-day. We'll go on next week and tell more. Find me all the animal bones you can; beef bones, mutton bones, or chicken bones, dry bones or soft bones. Find me pieces of fiber and gristle, and lime if you can. All that will help us in our lesson."

"Mamma, I am going to be a doctor," was Jack's cry as he ran off to get ready for dinner.

CHAPTER II.

THE NUMBER OF THE BONES.



NATURE, fortune, and art had given to Florence and Jack a beautiful home. It was placed in one of the old New England villages.

Near the edge of this village a lake had nestled itself away among hills and valleys. A high mountain rose in the distance.

On a knoll at the left of this lake our house had been built. It was a square frame house, with broad porches on each side. On the left were apple orchards, peach orchards, and cultivated fields. In front lay the broad lawn, with well-kept gravel walks where you first met my children.

They found constant pleasure in roaming through

the fields and orchards, or exploring woods which lay near the house. A large, flat-bottomed boat was anchored at the foot of the knoll, and the children could use the oars nicely. Both of them were also good swimmers.

At no time of the year did our home look so beautiful as now. I had taken the children out of school that they might enjoy it, and was giving them the weekly lessons that they might have something to think about. A simple study of nature.

In the second story of our house was a large room with two small rooms opening out of it. The large room had windows cut to the floor, where a view could be had of the lake and the hills.

I had given these three rooms to the children. The small rooms were their sleeping rooms. The large room was a place for their treasures. I passed the door not long after the day on which our last lesson closed. It was a little open, and, as I heard the children earnestly talking about something, I stopped to listen.

I soon found that a "dreadful accident" had hap-



JACK AS DOCTOR.

pened to Florence. She had broken her leg and both her arms. Jack was the doctor. He had got white rags tied around the leg and one arm, and was just tying up the other.

"Miss Blake," he said, "does it hurt now?"

"Of course it does, Doctor," she answered.

Just then I peeped through the door, and saw that the white cloth was one of my best towels. Jack held in his hand a bottle, and was pouring the contents on the towel. My heart sank, for I saw that the bottle was my bottle of Peruvian bark, and I knew that the stain would never come out. But I wanted to hear the end, and since the towel was spoiled, I kept quiet.

"Miss Blake," Jack went on, "I don't see why this hurts. This is 'Pond's Extract,' and I've heard that nothing hurts any more after that has been put on."

"Well, it's getting better," said Florence.

"Miss Blake," Jack continued, "your mother must rub this on every half-hour almost all day, and then the bones'll grow together."

"How do you know the bones'll grow together, Doctor?" asked Florence.

Jack forgot for a minute or two that he was "doctor," and said earnestly, "Why, Florence, John killed old Speckle the other day, and Becky cooked her for dinner. I found the funniest kind of a bone in her you ever saw. I saved it for mamma, and showed it to John. John said it was the bone of her leg. He said she broke the bone two or three months ago. He bound it up with a rag, and it grew together." And, "Miss Blake," he went on, remembering himself again, "if Speckle's leg grew together, your leg'll grow together, for your bones are made of the same thing that chickens' legs are made of."

"Doctor," said Florence, "I know just as well as you do what my bones are made of. They're fiber, and" —

"O, Florence!" said the doctor, "you must pretend you don't, because I'm a man, and I'm doctor."

"All right," said Florence, "but I'm tired of playing this. Won't you please take off these rags, and let's go out into the garden."

I slipped quietly away, for I did not care to be found out, and soon saw the children romping in the garden. They came in to lunch, their hands full of wood violets, and their hats covered with blossoms.

Thus the days slipped away until story-telling Friday came again. The children talked so much about their collection of bones that the servants in the house, and even the dog, had been made to furnish specimens.

Old Becky, the cook, came in to me one day, her white teeth shining, her hands on her fat sides, while she was bursting with laughter.

"Lor, Missus," she said, "pleas cum yerr to de window and see little Jack. He's got de dog by de tail."

I looked out. There stood Fido gnawing his bone for breakfast, and Jack sitting behind him holding on to his tail. He was afraid that Fido might run away with the bone, and, after the fashion of dogs, bury it. Fido did not seem to be troubled at first, but as soon as his hunger began to go away a little, he did not like to have his

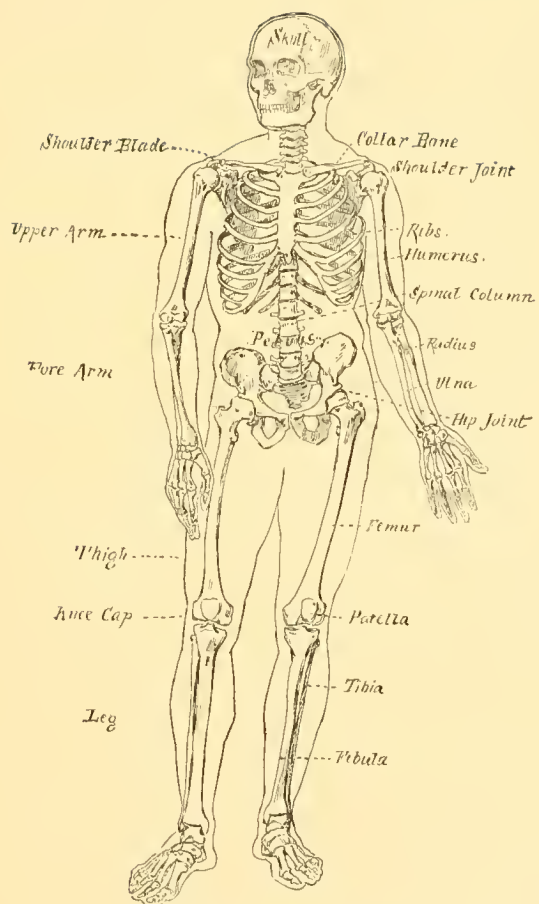
tail held so tight. He began to growl. But Jack still held on. The growling grew louder, and I got frightened. I called Jack and he was much displeased with me for doing so. He watched Fido, though, and carefully followed the fate of the bone.

When we sat down to our next lesson we found that the specimens helped us very much. We had lime, bones, soft and hard. In the hard ones we could easily see where the animal matter had been, and had dried away. We had first a long talk about them, and then went on with our work.

On a stand before me the children found two large books, both of them with long names. One of them was called *Encyclopædia Britannica*; the other a physiology. We did not stop to worry about the names to-day. We just opened the books and found some pictures we wanted. The first was a large man all bones, no muscle or flesh or skin on him; nothing inside of him. A bone man. I then began to read.

“Now, my children, look hard at this picture.”

I did not need to say this. They were doing it, their eyes and mouths wide open.



THE BONE MAN.

"Look first at his head. Look at the big, thick bones on top, with big round places to fit the eyes in, then at the little bit of a bone that belongs to the nose. The nose has not much bone in it. A large part of it is made of cartilage or gristle. Then look at the big bones of the cheeks, and the pointed bone of the chin. See the bones of the jaw that hold the teeth."

"O, mamma!" said Jack, "I can find them real easy."

"I can, too," said Florence, "I think it's splendid."

"Now," I went on, "I want you to look away from the picture, and feel your own heads."

Their hands went up in a minute.

"Feel the big bones on top, and behind. Feel those around your eyes, your ears, and your nose."

"O, mamma!" said Florence, "I feel them just as plain as day."

"Feel those on your jaw, and that sharp bone in your pretty little dimpled chins. Find those high bones in your soft, pink cheeks that mamma loves to kiss so much."

Jack was feeling so hard that he really forgot to talk.

Now I told them to find a picture of the bone-man's back. They found it, and I went on.

"Look right down the middle," I said, "and you will see what seems to be one long bone with spikes on it. These spikes stick straight out in the middle behind, and there is a row of spikes on each side of the middle row."

They saw the long bone, and before I had time to tell them, were feeling their own backbones. "Begin at the back of the neck," I said, "and feel down to the end of your backs."

"Mamma, I can feel Florence's humps better than I can mine," said Jack. "What's the reason? Oh! I know, I'm fatter."

"I'm glad I'm not fat now," said Florence, "even if the girls do call me 'leany! leany!' I can feel my spikes splendid."

Then we turned to the picture again. Fastened to the backbone on each side we saw twelve long, flat bones bent around toward the front. Some of

these were fastened to a thick, hard bone that went from the front part of the neck about down to the middle of the waist. We could all feel these nicely. The next thing we looked at was a bone going from the side of the neck to the top of the arm. On this bone we saw a large, flat piece of bone going down over the back.

"That's the shoulder-blade, isn't it, mamma?" said Florence. "We've felt that lots of times."

"Yes!"

Then we saw another bone fastened at one end to the front bone, and at the other end to the shoulder-bone. It is a slender round bone, and is called the collar-bone. They both felt that, too.

"Boys have stronger collar-bones than girls; so, Jack, you must be very careful of Florence's collar-bone. If a big dog comes along, and you have to fight it, you must hit it, because your collar-bone is so much stronger. It was not given you to make you rude and rough, but to give you strength and manliness. You need this because you have to go out into the world and do your work, and take care

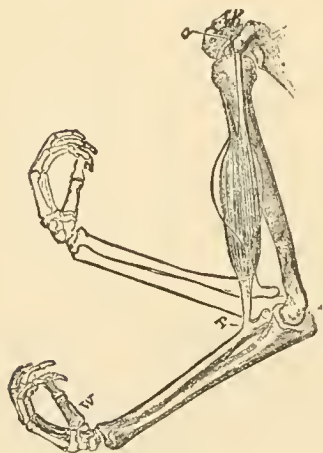
of your mamma and sister. Never forget that they are not made so strong as you."

"Now we come to the arm. In the top of the arm you can see one long bone. This goes from the shoulder to the elbow. Below the elbow are two

long bones, a large one, and one smaller. These go to the wrist."

"Mamma," said Jack, "I can feel that one bone in the top of my arm, but I can't feel two in the lower part."

"No; you can't feel two. They are covered with muscle and flesh."



BONES OF THE ARM AND HAND. A MUSCLE, THE BICEPS, IS SEEN, ATTACHED TO THE SHOULDER-BLADE, AT *a*, IN TWO PLACES, AND TO A BONE OF THE LOWER ARM IN ONE PLACE.

"The wrist is made up of eight very small bones. The great King has fixed them in there in a very wonderful way.

If anything happens to these little bones, it is very hard for the doctors to get them fixed again, they are all fitted together so nicely."

"Why can't we feel these bones?" said Florence.

"Because they are covered by things that feel like cords. They are called tendons. We shall study about them in another lesson. In the hand and finger you will see nineteen more little bones. These bones have to be very small, and so fixed that they can move."

"Because we have to move our hands so much," said Jack.

"Yes."

"Mamma, do you think papa could have made anything as strange as a person's body?" said Florence while she was moving her little fingers up and down, realizing for the first time the mystery of nature.

"No, Florence; the mind of the great King only could work it out."

"Now look down to the bone man's legs. Here you can see a large bone on the hip. This bone has a round hump on it. You can feel your hip-bones. Around this hip-bone are three or four smaller ones. Going from the hip to the knee is a long, large bone much the same shape as the one in the

arm. Larger, of course. Two smaller bones go from the knee to the foot. These are much like those in the arm, too."

"We can't feel these bones much," said Jack.

"Not very much."

"The ankles and feet are a good deal like the wrist and the hand. They have many little bones that are fixed snugly in their places. They are fixed in just such a way that the feet can do all the running and trotting, and skipping and jumping that they do. And the large, round heel-bone is put in. All the other bones of the body rest on these bones of the feet."

"I don't see how they can do it," said Jack.

"Well, when you grow older, and learn how things are balanced, you will understand it."

"Mamma, how are the bones joined together?" said Florence.

"We can't talk about that to-day, Florence. It is too long a story. Our next lesson shall tell about it. We have worked long enough for to-day, and there is Mary to get you ready for dinner."

When the preparations for dinner were finished we seated ourselves at the table. Papa took dinner in town. Jack, with his funny little way of asking questions, burst out, — “Mamma, are those bones in that roast beef real cow’s bones?”

I asked Florence what she thought of it, and she answered:—

“I don’t see how they can help being, for you have told us that beef was cow, and the bones seem to be in tight.”

“Yes, my dear, they are in tight, and I suppose some poor cow had those bones for part of its ribs before the butcher cut her up for our dinner.”

“Well, mamma,” continued Florence, “if the bones inside of us were all cut up they would look just about like cows’ bones, and dogs’ bones, and all those kinds of bones, wouldn’t they?”

“Yes, darling; only not the same size, and some of them are not the same shape.”

But I was afraid that the little heads would do too much thinking, and the rest of the meal I changed the subject to jackknives and dollies.

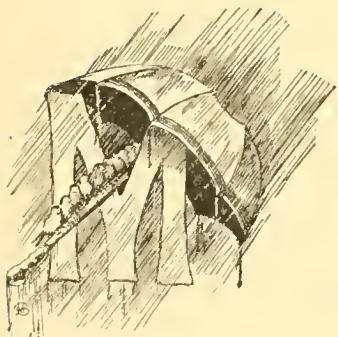
A day or two after I sat down with them. We took our collection of bones, and our picture of the bone man, tried to imagine him on four legs, and found out as well as we could where in those slaughtered animals the bones might have belonged.

Then neat, fussy little Florence took some clean paper, a pen and ink, and some mucilage, made some labels and pasted them on. Next we visited a carpenter. He made us a few little shelves. We set them up, covered them with paper, put our specimens on them, and the physiological cabinet formed quite an attractive part of the furniture in the children's room.

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CHAPTER III.

HOW THE BONES ARE JOINED TOGETHER.



AY days are not always sunshiny. The summer roses need water to nourish their roots and give color to their leaves. The fruit will not swell and perfect itself without the warm spring rain.

I tried to tell these things to Florence and Jack when they woke up Sunday morning to find cloudy skies and pouring rain. Monday and Tuesday followed with no brighter prospect. Sunday passed very well, for by means of the carriage we got to church and Sunday-school. Monday was helped through by the tool-box and the doll-house, story-books and puzzles, but by the middle of Tuesday morning, Jack had lost all his patience and Florence was whining.

Patient Mary was sitting in the room with them, sewing, and trying to be company for them, but nothing did any good. Each one of them stood at a window looking out, on the drizzle, drizzle, drizzle, a picture of wretchedness.

"I wanted to row to-day," said Jack, in a cross tone.

"Shure, I think ye's might row on that puddle there under the window, and shwim, too, for that mather," was Mary's quick answer.

"I'll row on you and pound you, too," was Jack's naughty reply.

"But Feth! I'm shure thin I'll drowned ye with me tears."

"I wish you'd go out and stop teasing us," said Florence, breaking into a "boo-hoo."

"An' is it tazin' ye's I am," she answered, "whin I've been mendin' Jack's kite, and sewin' your doll-clothes. I'll jist go and find another little gurrl liss onpleasant than yersilf."

"Well, good-by to you," said cross Jack as she went out.

I opened the door just as Mary left the room. I saw a gloomy picture. The furniture of the doll-house was on the floor, the puzzles were scattered in every direction. Jack's tool-box was lying on its side empty, and Florence's pet doll, the one with the real shoes and stockings, was lying on its face in the corner. The owners of these things looked as if they never expected to be happy again.

"Florence," I said, speaking sternly, "pick up your things and put them in order; Jack, stop your pouting and pick up your tools; then put the box in its place."

"That old Mary O'Hara can do it," snivelled Florence.

"Mary O'Hara will not do it," I answered. "You know you are not allowed to leave things out of order."

"I don't want to do it," began Jack, as he slowly went to work. "I won't play with my tools any more if I have to put them away."

I do not like to tell any more of this sad conversation. It ended in Jack's being shut up in his

bedroom and Florence severely rebuked. I told them as I left the room, that when they had clean, bright faces and their playthings were in order, they could come to me in my room.

I knew that the rainy weather was tedious to them and made them cross. But I also knew that all through life they must meet cloudy days as well as bright ones. I wanted to teach them that nothing drives away weariness like a contented spirit.

In half an hour the door to my room slowly opened and two little forms crept sheepishly in. I looked at the faces. They had been washed and were ready to look happy as soon as I said they might do so. I was ready to meet such faces with a smile, and the children were soon seated by me well-contented.

"O, mamma!" Jack cried, as he looked out of the window. "There's some blue sky. Hurrah, boys!"

Yes, we could see it plainly; the clouds were breaking away.

"Chickies," I said, "you know in three days it will be story-telling Friday."

"Yes, sir," said Jack. "I wish 'twas to-day."

"Well, how would you like a picnic on that day," I asked.

"Oh! lovely," said Florence.

Jack's eyes danced.

A picnic did not mean to Florence and Jack what it means to some children. It did not mean a hot day in the middle of summer, a long ride in crowded cars or steamboat, a dinner full of bugs under the trees, and a tub of warm lemonade.

We had our picnics in the bright days of spring, not so early that the woods were damp, and not so late that the dust of summer had taken the fresh look from the leaves. We loved to find the young wintergreens, and the trailing arbutus. We loved to see the brooks swelled by the little springs that were pouring into them from every side. They rush and plunge along, and look so savage, forming tiny waterfalls over the stones.

"Where shall we go?" said Florence.

"Shall we tell our story in the woods?" asked Jack.

"Shall we have something to eat?" said Florence.

"Oh! jolly," said Jack, hopping up and down.

"What would you say to 'Curtis's Woods,'" I asked.

"That's just the place," answered both at a time.

"We can take our dinner and tell our story there,"

I went on, "and have the rest of the day for finding moss and flowers."

"Shall we ride or walk?" Jack asked.

"We shall have so much baggage that I think John will have to take us in the democrat," I answered.

"Mamma, can't Hattie and Arthur Harmon go?" asked Florence.

"How would they like our story?" I asked.

"Oh! they would love it," answered Jack. "I told Arthur all about it, and he found me one of my nicest bones."

"Hattie said she wished her mamma could tell them one, but she never got time, she had to work and sew so hard all the time," said Florence. "Mamma, why don't you have to sew and work like Mrs. Harmon?"

"Because, my dear," I answered, "your papa has more money, and I can give the sewing and work to poor people who need it. This gives me more time to write stories for you."

"That's nice," answered Jack. "I wish everybody had it, but can we take Hattie and Arthur?"

"Yes."

"Can I go and tell them right off?" asked Jack.

"No, my boy ; not till it has entirely stopped raining."

"Suppose it rains Friday," said Florence.

"I do not think it will."

I had lived long enough in that climate to know that after a three days' storm in the latter part of May we were quite sure of a week or two of sunshine. As the sky was plainly clearing, I saw that three days would give the woods time to dry. Hattie and Arthur were told in good time.

Friday morning was bright and clear, and more happy faces are seldom seen than those of the four children. Becky came along, her back bending with the weight of the lunch-basket she carried, and as

she give it a "lift" into the wagon said, with a grin of satisfaction, —

"Dar, dem chilluns sh'n't starve, no ways, not while dis chile lib."

Mary was going with us, and it was a large load, even for the big democrat with three broad seats, but John had put two horses to it, and we squeezed in and were off.

"Curtis's Woods" was a large, open forest about a mile from our home. Mr. Curtis, who owned it, had cleared away the underbrush, but left the old trees and moss-covered logs for the enjoyment of the villagers.

There was no better place to find spring flowers and ferns, than here, and we all agreed that a more beautiful spot could not be found in which to spend a happy day. John landed us in the woods, and saw our baggage safely put away. Then, agreeing to return for us at half-past five in the afternoon, drove off.

It was half-past nine when we reached the woods, and the hour and a half until eleven passed quickly.

Mary and I spent it in arranging my table and specimens, and the children in finding arbutus and violets.

At eleven Mary opened Becky's big basket, and no sandwiches and cookies ever tasted better than those eaten under the elms and oaks of "Curtis's Woods."

But the children were fully ready for the story. Hattie and Arthur were as interested as the others, and we all began work in earnest. I had brought a work-table with folding legs. This held our large picture-books nicely. We found rocks, and with the aid of camp-stools, brought from home, made ourselves comfortable.

"Who knows where we begin to-day?" I asked.

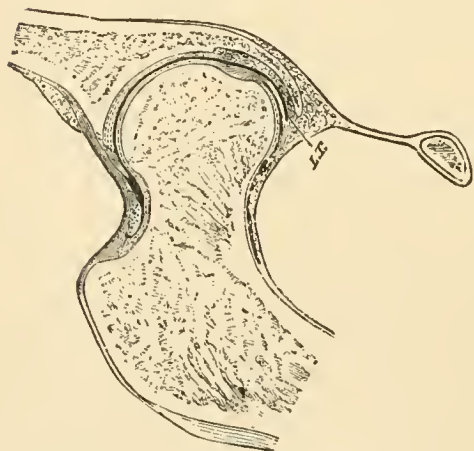
"I do," said Jack. "We find out how the bones are put together, and I'm glad of it, for all the week I've had to stop running every little while for fear mine would fall apart. It seemed as if I could feel them getting loose." We had to laugh at him a little.

"Mrs. Blake," said Arthur, looking into my face with earnest, dark eyes, "my father told me that

the bones had cushions on them just like the 'buffers' on engines."

"They have," I answered. "We'll know about it soon, if you all keep still. After I begin, you may ask your questions if you want to."

"The first thing we will talk about is the cushions



A SECTION OF THE BONES AT THE HIP. THE CARTILAGE, WHICH IS MARKED BY AN INTERRUPTED LINE, IS SEEN BETWEEN THE BONES, AND FORMS A SOFT CUSHION ON WHICH THEY MOVE.

that Arthur spoke of.

If the bones rubbed against each other, when they move, the ends would soon wear off, and when you jump or fall the shock that the bones would have in hitting against each other would hurt you, and the bones would break. On the end of

every bone is a cushion of cartilage. This cartilage is soft and elastic, like rubber. So you can see that it would be a good deal like two soft balls hitting against each other."

"But, mamma!" said Florence, "I should think the cartilage would wear out when the bones rub against each other."

"It would, but the great King has put something else there that prevents it. In every place where the bones are joined there is a white liquid like the white of an egg, being formed all the time."

"That keeps 'em oiled, don't it, mamma, just as you oil your machine?" said Jack.

"That's exactly right."

"Well, I think that's fixed about as nice as it could be," said Arthur.

"Don't you think it's all fixed so, Arthur?" asked Jack.

"Of course I do," he answered; "but I guess I don't know about the rest of it as well as you do."

"Now for the joints."

"What are joints?" asked Hattie, a timid little girl of nine.

"Joints are the places where the bones are put together. There are three kinds of joints in the body. Those where the bones don't move at all—

we find some of these in the large bones of the head; those where the bones can move only a little way, as in the hands and feet, and those where they can move a great deal, like the elbow and hip-joint."

It pleased me much to see the children. Some of them were wiggling their fingers, some of them making their limbs go, and Jack looked as if he were ready for a fight, with elbow doubled up, and his eyes glowing.

"Let us talk first about the immovable bones in the head. The edges of each one of those large bones have teeth like a saw. These edges are fitted closely into one another. Then the lower edge of one bone comes out further than the lower edge of the other. The upper edges are made the same way, so the edges are what carpenters called 'dovetailed.'"

We had to think and talk a good deal before the children all understood this. It was not easy, and I promised to have something to show them at the next lesson that would help them.

"I don't believe my head will come to pieces any way," said Jack, "it don't feel rickety."

"There is one movable bone in the head; who can tell me what it is?"

"The jaw," answered Arthur.

"Yes. If you look at the picture of the jaw-bone you will see two round humps at each upper end at the back. These have cushions of cartilage on them, and are fitted into round places made for them in the bones of the head. These round places are lined with cushions.

"But why don't the jaw-bone fall out?" asked Florence."

"Because it is strapped in."

"Look close at the picture, and you will see on each side of the jaw three strong straps going in different directions over the joint."

"What are the straps made of?" asked Arthur.

"Strong, tough fiber. This fiber will not break, but will bend and stretch. These straps are called ligaments, and they are oiled like the joints."

One would have thought the children were a set of bears with nothing to eat, they all began to move their jaws so fast.

"Now about the strange backbone. This backbone isn't one bone at all, but many different ones. Children have thirty-three bones in the back, grown people twenty-four. Some of the end bones grow together after people grow older. These bones are shaped like a ring, larger on the inside, and with three pieces that stick out on the back. You must look at your picture and see it."

"What are the holes for?" asked Florence.

"They hold what is called the spinal cord. This comes from the brain, and we will learn about it later in our lessons."

"I see little holes at the side of the backbone," said Arthur, "what are those for?"

"Nerves go out through those. These bones are joined by cartilage, and are strapped together by four sets of straps lapping over each other. There is one set of the straps on the inside, and one set on the outside of the bones."

"Do you mean on the side where the spikes are?" said Florence.

"No; the other side. The spikes are on the back

side of the bone. These straps are on the front side."

"What are the spikes for?" asked Jack.

"To fasten the muscles to."

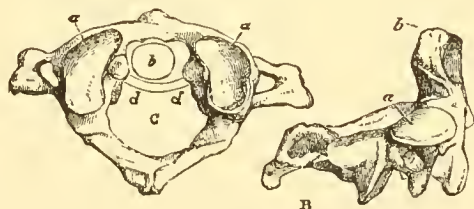
"The cartilage lets us bend our backs, doesn't it?" said Florence.

"Yes. Now the top one of these backbones is called 'the atlas.' Can any one of you tell why?" I asked. They were all silent a few minutes, then Arthur answered, thoughtfully.

"I think Atlas was the name of a giant that people used to think held the world on his back. This bone holds up the head, and I guess that's the reason."

"We have a picture of Atlas in the front of our geography," said Jack.

"Yes; that is the reason of the name. The atlas and the second one of the backbones are formed dif-



A, THE ATLAS; *d-d*, THE "STRAP" DIVIDING THE HOLE IN TWO PARTS; *a-a*, THE PLACES WHERE THE SKULL RESTS; *c*, SPACE FOR THE SPINAL CORD, *b*, SPACE WHERE THE "BONE LIKE A STICK" GOES. *B*, THE SECOND BONE; *b*, THE PIECE THAT STICKS UP LIKE A STICK.

ferently from the others, and support the head. The hole in the atlas is larger than the hole in the other backbones. This hole is divided into two parts by a strap. The second bone has a round piece on it that sticks up like a stick. This stick goes up through the front hole in the atlas, and is strapped to the bottom of the head. It makes a pivot for the head to turn on, and is fastened in all ways, and held in its place by strong straps."

"What goes through the other hole?" said Jack.

"The spinal cord going from the brain. This backbone runs down to a little point, and this point is fastened tight into one of the large bones at the back of the hip-bone. It is held securely there by straps."

The children could see this plainly in the large picture of the bone-man's back that they found in the *Encyclopædia Britannica*.

"Now about the ribs. These are fastened with straps to the back-bone. In front they end in strips of cartilage. If you look at the picture you will see that seven of these are fastened to the breast-

bone, and five are not fastened at all. These five are called 'floating ribs.' "

"Why do they have all that cartilage in them, mamma?" asked Florence.

"Because the lungs are inside of the ribs, and the lungs grow larger when they are full of air, so the ribs have to stretch. The joints where the arm is fastened to the shoulder, and the one where the leg is fastened to the hip, are called 'ball and socket joints.' Arthur knows about balls and sockets. He has seen them in his father's machine shop."

"O, yes! I have, too," said Hattie.

"At the top of the arm is a large, round ball with a cushion of cartilage on it. This is fitted into a large, round place in the shoulder-bone. It is held here by very strong straps, and can move in many ways. Why, Jack?" I asked, as I saw he wanted to say something.

"Because it is a ball, and can wiggle all around."

"You have it. The elbow and knee-joints are like hinges. The bones have pieces on them like the

parts of a hinge, and are strapped together so that they work in that way."

"Well! I'm tighter than I thought I was," said Jack.

"The knee-joint is covered by a round bone called the 'knee-pan.' I will tell you of this when we talk of the muscles. The joints of the leg and arm are not exactly alike, but they are so much so that this is all it is necessary to learn now. The small bones in the wrist and hand, and those in the ankle and foot, are fastened together by cartilage and straps so that they can make all the movements that are necessary; and don't forget that the joints and straps or ligaments are being oiled all the time. But this is enough for to-day."

"Mrs. Blake, it makes a boy feel as if he didn't amount to much, when he finds how much God can think of that he can't," said Arthur.

"I hope it does, Arthur."

The children would have lingered to talk, but I did not think it best, and as Mary had lunch ready, we went to work at that.

I do not need to say much of the after-dinner

pleasures. They can be imagined. We waded in the brooks, we dug moss and ferns, we sailed boats on the tiny streams. Above all, we enjoyed the beautiful shade of the trees. Follow us, if you will, on our ride home as the sun was setting. Hear the children tell papa the pleasures of the day, and, at last, after the evening prayer, go quickly with them to the land of dreams, as they lay their tired heads on the pillow.

CHAPTER IV.

MUSCLES, FAT AND SKIN.



LITTLE way behind our home there was a deep ravine. The children had named it "The Glen." Its sides were steep and rocky, but the bank leading down to it was divided into two parts. From the top one could easily climb down to a broad grassy plain; but, from here, the bottom of the ravine was reached only by a narrow, rocky path.

At all times of the year, except in the spring, the bed of the ravine was dry. Now, a narrow stream rippled over the rocks. When my children were younger the spot had been a terror to me. Now they had grown reasonable and sure-footed, and I had ceased to be anxious about it.

Florence and Jack, Arthur and Hattie, playing together, one morning, a day or two after our last chapter closed, made their way here.

As they wandered along the edge, they saw peeping up on the grass plain some large starry daisies, the first of the year. It was an easy matter to run down the first bank, and all four of them were soon gathering the daisies and trimming their hats.

Little Hattie was not quite so strong and sure-footed as the rest, and the boys generally took pleasure in watching over and guiding her footsteps.

To-day she had picked a lap-full of daisies, and seated herself on the ground before the others were ready to sit down. They did not notice her, therefore, until they heard a sharp scream. Looking around, they saw that the ground under her had broken away, and that she was falling down, down over the rocks, into the stream below.

Arthur and Jack looked at each other, their faces white with terror. Florence, quick as thought, climbed up the bank and ran for help. The boys were terror-stricken only for a moment. One sight of Hattie,

lying white and still at the bottom, decided them what to do. They scrambled quickly down the rocky bank. Hattie was not lying entirely in the water.

The stream was narrow and not deep. No more than half her body was covered by it. But she did not speak or move. Arthur called:

"Hattie! Hattie! Can't you speak to us?"

She could not answer.

The boys summoned all their strength and courage. Together they lifted her out of the water, and began to make their way to some place where it would be possible to climb up with so heavy a burden.

It was well that Florence had found other help. She had run to the stable as fast as her feet could carry her. Here John was at work. Only the words, "Hattie has fallen down the Glen," were needed to take the strong Irishman with great strides to the place of the trouble. The strength of the brave boys was fast giving way. John leaped over the first bank, two steps took him down the second, and with the gentleness of a woman, he lifted the little girl, and carefully brought her to the top.

"Bless yer dear heart," he said, "why must a little, gintle, tinder plant, like yoursilf, be gittin' into sich trowble? Florence, go for yer mother, as fast as ye can."

She did not need the command. As soon as she saw that Hattie was being safely carried to the top, she had flown for me. I was on the spot almost as soon as Hattie was laid on the grass. Bathing her face with water and camphor, and giving her a swallow of wine, we brought her to consciousness.

Hattie's home was not far, and I quickly decided that it was best for me to tell the story to her mother before the little girl was taken home; leaving her, therefore, in the care of the others, I hastened to the house.

Mrs. Harmon, though worn by care and anxiety, was a woman of strong nerve and common sense. The heart-sinking and deadly faintness which she felt when she first heard my story, lasted but a moment, and very quickly she was preparing the bed for her little daughter. She whispered only one sentence in my ear:

"Mrs. Blake, God is going to take my child, Hattie; she is too pure for this world."

I answered nothing, for I did not yet know whether to hope or fear.

I went back to the Glen, and told John to carry her home. As he lifted her she moaned and became unconscious again.

I told Jack to go to the barn, saddle his pony, and gallop for the doctor as fast as he could. He was very glad to have something to do for his playmate, and it took him only a few moments to get ready.

In half an hour the doctor was in the house. His serious look as he saw Hattie's face, still and white as the pillow on which it lay, showed me that it was no light trouble. His examination said that the collar-bone was broken and the ankle sprained. He could find as yet no trace of anything else.

The bone was set in place and the ankle bound up. Hattie could speak to us a little, and we went home to lunch, feeling more hopeful. We knew, however, that for many weary weeks she must lie still, and that, perhaps, much pain was before her.

Fever set in, and for a few days we felt almost sure that our little friend would die. But she was young. The doctor was skillful and watched her carefully. Mrs. Harmon and I nursed her, and in a week we could see that she was getting better.

Arthur could not be kept out of her room, but soon his pale cheeks told us that he must stay away. I took him to my home to be one of my children. For a time each day found him helping his mother, but when I told him that if he worked more than he ought, he too would be sick, and add to his mother's care, he was carefully obedient to every command I gave him.

Story-telling Friday came, but I had been so constantly by Hattie's bedside that I was not able to do the necessary work. The children, too, were sad and troubled, and we decided that it was better to pass by that week and wait until the next.

The next week found our little girl brighter and better. On Thursday she drew me toward her, and begged me to tell the story the next day by her bedside. The doctor said it would "do her good ;

get her mind off her aches." So we met on Friday around a table by her bedside.

"Mamma," said Jack, "it seems like a year since that lovely day in the woods."

I could only say, "Yes," for I knew we all felt it. But we must begin work, and it did not take us long to get interested.

"Mamma, are we through with the bones?" asked Florence.

"Yes; the teeth are bones; but we can not talk about them now. We shall tell about the covering of the bones to-day. Who knows what it is?"

They began to feel of themselves, and Jack said:

"Skin covers the bones."

"Yes; and what else?"

"Fat or flesh or something," said Arthur.

"Something, certainly. Perhaps fat and flesh; or, better, flesh, fat, and skin cover the bones.

"In the first place, let me tell you that flesh is the meat that you find in animals, and meat is muscle."

"I never understood about muscle," said Arthur.

"We'll try to help you now."

"The bones, you know, can be moved, but they have no power to move themselves. The muscles move them."

"How are the muscles fixed? What do they look like?" asked Florence.

"They are different shapes, but they are all much larger in the center than they are at the ends. The middle part of the muscle is made of red meat. This meat is full of fibers. These fibers come nearer and nearer together until at the ends of the muscles they are so close together that they become strong cords or ropes. These ropes are the tendons that we can feel in our wrists."

"Why are they called muscles? That's a funny name," said Jack.

"There's a funny reason for it. There is a Latin word *musculus*, meaning little mouse. People used to think that some of the muscles looked like little mice, so they gave them the name muscle. These ropes are fastened into the bones that the muscles are going to move."

"How do the muscles move?" asked Arthur.

"They draw up."

"Can they be stretched out the other way?" asked Florence.

"No; they can only move back as they were at first. When a bone needs to move two ways, there is a muscle on each side of it to move it each way."

"How many muscles are there?" asked Florence.

"About four hundred," I answered.

"Mercy!" said Jack, looking with surprise over his body.

"If you turn a few pages beyond the bone-man in the encyclopædia," I went on, "you will see a muscle-man; that is, a man with nothing but muscles on him. If you look close, you can see, especially in the limbs, the shape of the muscles. You can see how large and full they are in the middle, and how they go out to ropes at the end. The ropes cannot draw up; all the power lies in the middle of the muscle."

"How do the muscles know when we want them to move?" asked Jack.



THE MUSCLE-MAN.

"Nerves go down into them from the brain, and tell them," I answered.

"How does the brain know, and how do the nerves know?" asked Jack again.

"Jack," I said, "we must leave it there. God alone can tell you that. Men have spent their lives in trying to find out, but one after another have come to the same end that we have reached to-day. They don't know. I shall not try to tell you how all these four hundred muscles work. Think of the thousand movements that you make, and you will know the reason."

"We never could remember, if you did tell us, could we, mamma?" said Florence.

"No. One thing more I will tell you about them. There are two kinds of muscles. One kind that moves when we want them. These are called voluntary muscles. Another kind that moves whether we want them to or not. These are called involuntary muscles. The voluntary muscles lie in our hands, arms, and all over the body. These, you know, we can move just when we wish to. The involuntary

muscles are such muscles as the heart, and those that have to do with breathing. This kind of muscle works in the stomach when we digest food. There are a good many of these."

"Why don't the muscles wear out?" asked Arthur.

"They have blood-vessels in them, and are being fed with blood all the time. But we will leave the muscles now, and talk about the fat a few minutes. This is a covering for the muscles, and a layer is formed over the muscle and under the skin. This layer is much thicker in some persons than in others."

"O, yes!" said Jack; "Arthur and Florence are both fatter than I am. What's the reason?"

"There may be different reasons. More of your blood may be needed to feed the muscles, because your muscles are stronger. Or more may be needed to feed the nerves. We cannot always tell just the reason."

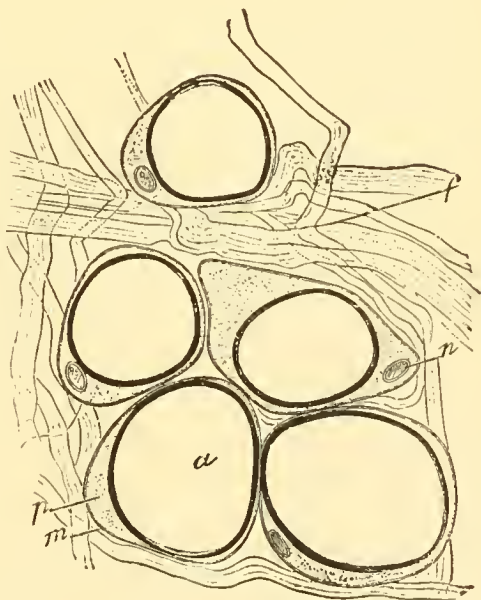
"Do you find fat anywhere else in the body?" asked Arthur.

"Some on the organs inside of the body," I re-

plied. "Fat is very nice to pack around delicate organs, and to cover the nerves with. It is used for this. You all know how it looks in animals.

If you look at it through a magnifying glass, you can see little cells of membrane filled with oil. Fat is all made up of these little cells."

We sent for some beef fat and our glass, and found that this was true. Next we passed on to the skin.



FIVE OF THE LITTLE CELLS OF MEMBRANE FILLED WITH OIL. GREATLY MAGNIFIED.

"There are three layers of skin," I began. "The layer next the fat is called the true skin. It is covered with little points. If you look at the inside of your hand, you can see that these little points lie in ridges."

"What are the points for?" asked Florence.

"The nerves come into them and divide into little bits of branches. When you touch anything with your body, or when anything touches you, these nerves make you feel."

"Then the feeling is in the skin?" said Jack.

"Yes. The true skin is covered by two more layers of skin that are very closely joined together. These are joined so closely that they seem like one."

"Do they have feeling points in them?" asked Jack.

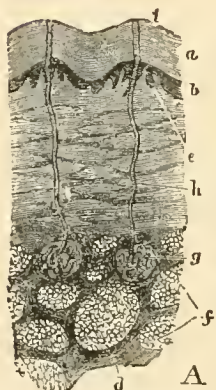
"No; they only cover the true skin."

"Is it thick?" asked Florence.

"Much thicker in some places than in others," I answered. "On the bottom of the foot and on the inside of the hand it is thicker than in other

places. It grows hard where it is used. The skin of a working-man's hand is almost like leather."

"Yes; and baby's skin is very thin and soft, isn't it?" said Florence.



SECTION OF THE SKIN. *i*, A PORE AT THE SURFACE OF THE SKIN; *g*, THE ORGAN THAT FORMS PERSPIRATION; *h*, THE TUBE THAT CONNECTS THE ORGAN WITH THE SURFACE OF THE SKIN.

"Then, too, all three of the skins are full of little holes, pores, we call them. These do a great deal of work. Under the skin are organs that form perspiration. This perspiration comes out through these holes and keeps the skin moist. A great deal of impurity goes away from the body in that way."

"That is why we have to keep clean, isn't it?" said Jack.

"Yes. This impurity has to be washed off, as well as the dirt that comes on from the outside."

"I should think things would go into the body that way, too," said Arthur.

"That is just what they do. People that are very sick, and cannot swallow, are sometimes kept alive a long time by being bathed in beef tea."

"That's funny," said Jack. "It goes in through the holes."

"What makes some people black and some people white?" asked Arthur.

"In the second skin are little holes that are filled with dark-colored matter in colored people. Indians are copper-colored, you know, and negroes black."

"I always used to think it would wash off," said Arthur.

"Mamma, what is the tongue made of?" said Jack. "There are not any bones in it."

"No; it is muscle."

"Well, what makes it red?" he went on. "It's covered with skin, isn't it?"

"Yes."

"Well, what color is the skin?" he asked.

"It is clear, without color, and shows the colors under it."

"O, yes!" said Jack; "and the tongue is the color of the red muscle. The color of the body looks mixy, doesn't it? The color of the fat and the muscle together."

"Yes; it is mixy."

But the dinner-bell called us away.

Hattie had lain quiet during the lesson. Once or twice she had tried to ask a question, but I had gently placed my hand over her lips. When the children had gone out, and I was gathering up my things, she drew me toward her.

“Auntie,” she said, for she had given me this name since she had been sick, “Jack has told me about the ‘Great King,’ and how much he loves us. Last week, when I thought I was going away from you all to live with him, I wasn’t afraid, for, when I looked at my body, and saw how wonderful it was, and when I knew he had made it for me, a little bit of a girl, I was sure he loved me, and that I should go right to his arms.”

“He will gather the lambs in his bosom,” I murmured, and with a long kiss on her forehead, I left her.

CHAPTER V.

THE ORGANS THAT TAKE CARE OF BLOOD.



IKE all children, Jack enjoyed the hay-loft. It was a large, airy room, and, when not full of hay, was a good place for circuses and wonderful shows, which he and Arthur fixed up. These shows seemed remarkable to Florence and Hattie, and the other children in the neighborhood. Just now there was enough hay in it to make it a good hiding-place for the hens, and each day Jack enjoyed his search for eggs. He was busy at this one morning when he heard John at work below, humming an old Irish tune.

"O, John!" he called.

"An' is it yersilf, Jack, that's up there?" John answered.

"Yes, it is," called Jack; "and I've found old

Brownie. She's setting up here on eleven eggs. She's got her nest clear back behind an old beam."

Just then a "cackle, cackle, cackle," told John that Brownie was disgusted at being pulled off to have her eggs counted.

"Och, the rascal," said the Irishman, climbing the ladder leading to the loft; "din't she know that nobody intinded to have her a-sottin'? I'd like to wring the nick off her."

Jack knew John well enough to feel sure that Brownie would not be badly treated, and he said, "Well, some chickens, that's all."

"Yis," said the Irishman, "some more chickens; but it warn't the chickens we were afther, 'twas Brownie's iggs. We got a plinty o' chickens." With this, he gave Brownie a hard cuff and pulled her off her nest. Shaking her a little, he looked first at the eggs and then at her, but ended by saying: "Och! ye might as well go back ag'in. It's three days sence ye been missin's; yer iggs are spilt intirely."

Brownie, glad of the permission, settled back contentedly.

"How many iggs have ye got, Jack?" said John, looking into Jack's basket.

"Nine," answered Jack; "I've been to all the nests."

"Well, ye bether come down now," said John, leading the way down the ladder.

Jack waited for John to go down, and then, handing down the basket, followed. John and Jack were good friends. When not too busy, the good-natured Irishman listened patiently to Jack's string of questions, and answered them as best he could. This always made a path to Jack's heart.

"John," said Jack, as he saw the man sitting down on a broken-backed chair, to mend a piece of harness, "did you know that all your flesh was muscle, fastened to your bones by ropes?"

"That I didn't," said John; "won't ye tell me about it now?"

"Oh! the middle part of your muscle draws up, and the rope pulls the bones along. That's the way you move your legs and arms, and everything," answered Jack.

"Now, that's quare," said John; "why ain't they a-drawin' up all the time, thin, and kapin' the bones a-goin'?"

"Because," answered Jack, "something inside your head don't tell them to."

"Och! that's it, is it?" answered Jonn. "Well, it's a shmart b'y ye are, any way. Ye'll be a docther one day, shure."

"May be so," answered Jack, as he sauntered off down toward the lake.

He felt a little lonely this morning. Arthur was reading to Hattie, and Florence was practicing. He missed Hattie. In her gentle way, she was a rest to his nervous impulsiveness, and to her he was the ideal of all that was brave and manly. She would sit contented for a long time while he told her about the engines that he would buy when he had worked and saved a million dollars.

He told her how he would have a nice place for her, so that they could ride all over the world and see the steamboats and the oceans and all the wonderful things. Thus in her dear little heart she

was forming a fairy-land, of which Jack was the presiding genius.

To-day he sat down on the bank of the lake. He scarcely noticed the ducks waddling about, or swimming quietly in the water. He was thinking of her. The doctor said that before long she could be carried out under the trees. He wished the time would come. He wished he could do something for her, something big, not just little things like reading to her or carrying her flowers.

The sight of the boat anchored near made him think that perhaps she would like a nice trout for breakfast. Jack had a fishing-pole upstairs. His uncle had given it to him. He had never used it. He was too young to know much about fishing, and, as I thought it a little cruel to catch the pretty shiners just for fun, I had never said much about it. With Jack to think was to act. In five minutes he had rushed upstairs, got his pole, climbed into the boat, and was rowing with all his might toward the other side of the lake.

There were just as many fish on our side of the

lake as on the other, but this must be a surprise to every one. The distance was soon passed over. It did not occur to Jack until he had nearly reached the other side that he had left the anchor on the shore, and that he had no bait.

"Well," he thought, "I'll pull the boat on to the bank, and dig some worms over there."

He reached the other side safely, jumped out and pulled the boat on to the bank about half-way out of the water. Then taking out his jack-knife, he dug some angle-worms. Jack did not know that our dear little lake had never seen a trout, and that if it had the trout never would have come to eat an angle-worm.

A "trout for breakfast" sounded nice, so Hattie must have one.

It made him a little sick to put the wriggling worm on the hook, but he mastered it, and hopefully threw his line into the water.

Half an hour he sat there fishing. The cork would bob up and down with the waves. Once in a while the hook would catch in some sea-weed at the bot-

tom, and pull the cork down. Jack would pull up the hook with a jerk, sure he had a fish. But each time he was disappointed.

At last a bite! Up came a shining little perch. It rather frightened Jack. It wiggled so. He did not know exactly what to do with it. But he got it off the hook, and carefully laid it on the grass beside him.

Now he must catch another, just one more. That was a little one; perhaps he could get a bigger one. Another half-hour of waiting, and he drew up one about half as big as the first.

"Bother!" he thought. "They don't seem to come very fast."

He took off the fish to lay it beside its brother. Lo and behold! its brother wasn't there. Finding itself free, the fish had wiggled into the water again. Jack was discouraged, but with a string he made this fish fast to a stick, and stuck the stick into the ground.

Just as he was baiting his hook again, in a tired way, he looked around, and the boat—oh! the boat.

There it was quietly drifting down, down with the current. Jack's temper got the better of him.

"Oh! oh! oh! you hateful thing!" he screamed, jumping up and down.

An hour in the hot sun had tired him out, and, throwing himself on his face in the grass, he burst out crying.

After he had cried a few minutes he felt better, and began to think what to do. Acting quick as a flash again, he threw off his jacket and plunged in to swim after the boat. He soon reached it, and climbed in. The oars lay inside, and he rowed back. He picked up his jacket and his fish. He had forgotten to take off his hat, so that had sailed away on the lake. He now rowed with all his strength for home.

I had just sent Mary to search for him, when the soaking wet boy, without any hat, holding in his hand one small fish, hanging to a string, entered the room. He had forgotten his pole and left it on the other side of the lake.

"What have you there, Jack," I said; "and where on earth have you been?"

"I've got a trout for Hattie's breakfast," he said, half-laughing and half-crying; "I caught it in the lake."

He then told his story. Later in the day, when he was dried and rested, I told him that he must never do it again, without coming first to me.

I think he learned the lesson.

The next day was Friday. We met for the second time in Hattie's room. Her dear little face looked a good deal more natural than last week. Its roses were coming back. The little shiner had been cooked for her breakfast, and she cast loving, grateful looks at Jack, as we seated ourselves around the table.

"Mamma, I've been trying to think what you will tell us about to-day," said Florence.

"Well," I answered, "what is it that I have told you keeps all the bones, muscles and skin, alive and growing?"

"Blood," answered Arthur.

"Yes. We'll say something about blood to-day, or rather the organs inside the body that take care of the blood."

"Mamma, can't I stick a needle in me just for a drop of blood to look at?" asked Jack.

"No; you've seen it a great many times; keep still, and listen to me a minute. Inside of the ribs there is a flat muscle that divides the hollow place inside into two parts, an upper part and a lower part. The muscle has a long name. It is called the diaphragm. We don't learn many hard names, but I think you had better learn this one."

They repeated it after me, and soon learned it. We then found a picture of this flat muscle in our books. It is curved so that the back of it is fastened to the bony wall a good deal lower down than the front. The part above the flat muscle is called the chest. The lower part is called the abdomen.

"The lungs are in the chest, are they not?" said Arthur.

"Yes; the chest holds the lungs and the heart."

"We breathe through the lungs, don't we?" said Hattie.

"Yes."

"Mrs. Blake," said Arthur, "I've been trying to think why we have to breathe. The air just goes in and out again."

"Wait a little and you shall know. I want to

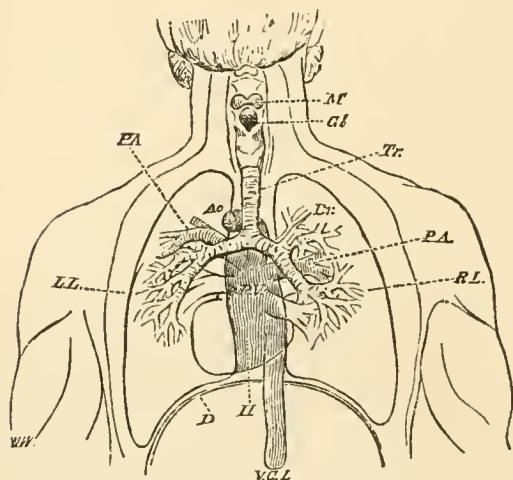


DIAGRAM OF THE POSITIONS OF ORGANS IN THE NECK AND CHEST. *M*, THE MOUTH; *Gl*, THE OPENING INTO THE LARYNX; *Tr*, THE TRACHEA; *LL*, LEFT LUNG; *RL*, RIGHT LUNG; *Br*, BRONCHIAL TUBES; *H*, THE HEART; *D*, THE DIAPHRAGM.

tell you about the lungs first. In the back part of your throats are two hollow pipes. You swallow your food through one. That leads to the stomach. The other carries air to the lungs. This pipe is called the windpipe."

"Things get into the windpipe when they almost choke us, don't they?" said Jack.

"Yes; but the windpipe has a little door, made of muscle, that does not often let things go down. When this pipe gets down a little way it divides

into two other pipes. One pipe leads to the left lung, the other to the right lung. When these pipes reach the lungs, they divide into a great many little tubes ; and, finally, into little bags, called air-cells. Each lung is divided into different parts, called lobes. The left lung has two lobes. The right lung has three. Each one of these lobes is filled with branches of the windpipe and with air-cells."

"Doesn't the trachea have something to do with the windpipe?" asked Arthur.

"Yes. Now, so that when you hear the names, larynx, trachea, and bronchial tubes, you will know what they mean, I will tell you that the larynx is the beginning of the windpipe. Then the windpipe is called the trachea, until it divides into two parts. After that it is called the bronchial tubes."

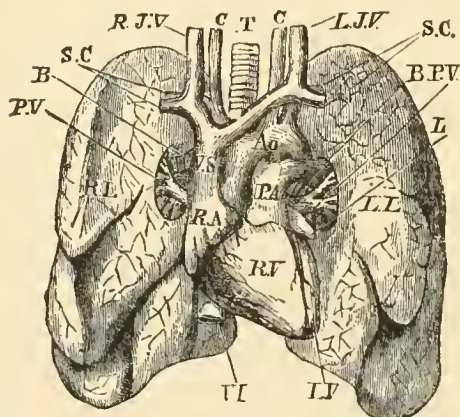
"Is there anything else in the lungs?" said Florence.

"Yes ; I'll tell you about it presently. These air-cells and tubes are all shut up in a bag made of very tough skin. This skin is lined with a smoother, softer skin. The bag is called the pleura. You see we have a good many hard words to-day."

"Yes'm," said Arthur; "but I've heard almost all of them, and didn't know what they meant. Don't people have pleurisy?"

"Yes; pleurisy is a disease of this membrane. This membrane lies close to the ribs, the breast-bone and the backbone.

The lungs take up the larger part of the chest, but they leave room for the heart."



THE HEART, LUNGS AND OTHER ORGANS. *RV*, THE RIGHT VENTRICLE; *RA*, THE RIGHT AURICLE; *LV*, THE LEFT VENTRICLE; *LA*, THE LEFT AURICLE; *RL*, THE RIGHT LUNG; *LL*, THE LEFT LUNG; *T*, TRACHEA.

We studied our picture of the lungs now, so that we could understand about them, and then spoke of the heart.

"Mamma," said Florence, "next time Becky

cleans a chicken, can't I ask her for its lungs and its windpipe?"

"I'll be glad to have you, and it will help you to understand about it, if you look at it. The heart," I said, "is a large hollow muscle. It is divided

by a wall of muscle into two sides; each of these sides is divided by another wall into two parts; an upper part and a lower part. The two sides do not open together, but there is a door that opens between the upper part and the lower part of each side."

"Why is the heart divided so?" asked Florence.

"The right half of the heart holds impure blood, the left half pure blood," I answered.

"How does it do it?" asked Jack.

"The impure blood starts," I said, "in the upper part of the right side of the heart. This part of the heart is called the right auricle. People have given it the name because they thought it looked like the ear of some animals. From this auricle it goes through a door into the lower right side."

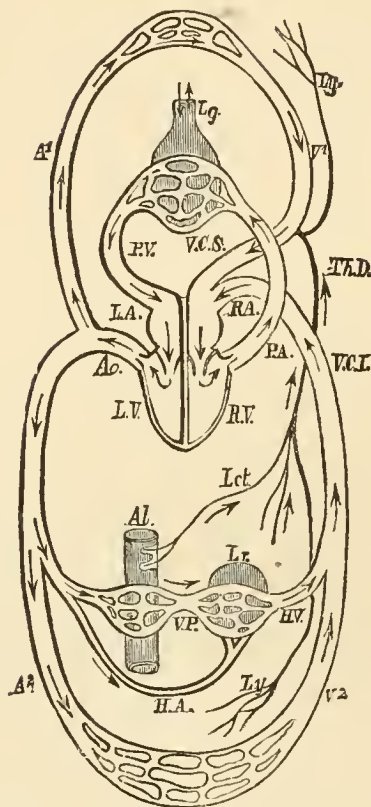
"What is the name of the lower right side?" asked Florence.

"That is called the right ventricle."

"What does that word mean?" asked Jack.

"It merely means opening."

"How does the impure blood get pure?" asked Arthur.



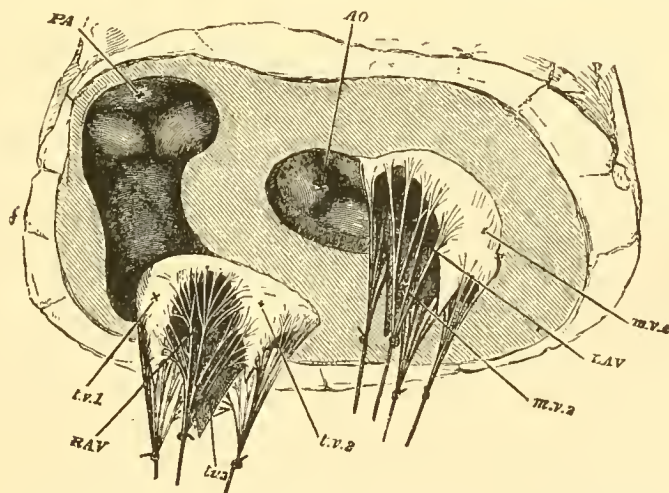
A DIAGRAM SHOWING THE CIRCULATION OF THE BLOOD. THE ARROWS INDICATE THE COURSE OF THE BLOOD, LYMPH AND CHYLE. *LA*, LEFT AURICLE; *LV*, LEFT VENTRICLE; *AO*, THE GREAT ARTERY; *A1*, ARTERIES TO THE UPPER PART OF THE BODY; *A2*, ARTERIES TO THE LOWER PART OF THE BODY; *HA*, THE ARTERY WHICH SUPPLIES THE LIVER WITH PART OF ITS BLOOD, *V1*, VEINS OF THE UPPER PART OF THE BODY; *V2*, VEINS OF THE LOWER PART OF THE BODY; *RA*, RIGHT AURICLE; *RV*, RIGHT VENTRICLE; *Lg*, LUNG; *Lx*, LYMPHATICS; *Lr*, LIVER; *PA*, THE ARTERY THAT GOES TO THE LUNGS; *PV*, THE VEIN THAT BRINGS THE BLOOD BACK FROM THE LUNGS.

“Now, I’ll answer this question and the other, about why we breathe, together. We breathe to make the blood pure.”

“Is that all we breathe for?” said Florence.

“From the right ventricle the blood—it is impure, you remember—flows into a large tube that leads to the lungs. When this tube gets to the lungs it divides into very many little bits of tubes called capillaries. These tubes run into the lungs, and

lie all around by the side of the air-cells. The impure blood flows through these capillaries. The skin of the air-cells is very thin, and the skin of the capillaries is very thin, too ; so the blood can easily draw from the air whatever it wants to make it



"DOORS" IN THE HEART AS SEEN FROM BELOW. *RAV*, DOOR BETWEEN THE RIGHT AURICLE AND THE RIGHT VENTRICLE; *LAV*, DOOR BETWEEN THE LEFT AURICLE AND THE LEFT VENTRICLE.

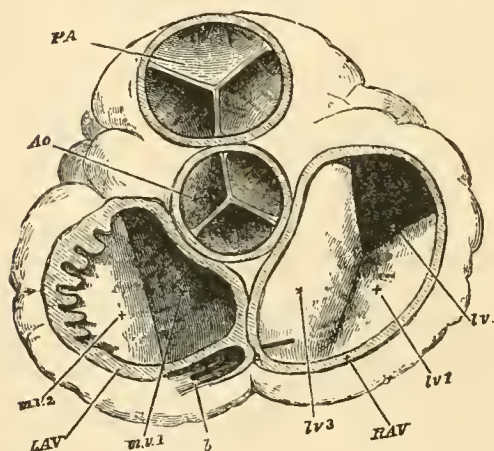
pure; and it can give to the air the impure gas that is in it."

"What does it get from the air, mamma?" asked Jack.

"A gas called oxygen, and it throws into the

air another gas called carbonic acid gas. When the blood goes into the lungs it is almost black in color, but when it leaves the lungs it is bright red."

"How does it get out of the lungs?" asked Arthur.



"DOORS" OF THE HEART AS SEEN FROM ABOVE: *PA*, DOOR TO THE ARTERY LEADING TO THE LUNGS; *RAV*, DOOR BETWEEN RIGHT AURICLE AND RIGHT VENTRICLE; *LAV*, DOOR BETWEEN LEFT AURICLE AND VENTRICLE.

"All the capillaries come together again into a large tube," I answered, "and carry the pure blood out into the left auricle of the heart; that is, the left upper side. From here it flows through a door into the left lower side, or left ven-

tricle. From here it flows out through a large tube all over the body."

"Does this one big tube go everywhere?" asked Jack.

"No; it divides into many smaller tubes. These

smaller tubes divide into capillaries, and all the muscles, bones, skin, and large organs of the body are filled with a network of them."

"Does the blood get impure again?" asked Florence.

"Yes; it gives to each organ that which will feed it, and gathers a great deal of impure matter."

"How does the bad blood get back?" asked Hattie.

"By more tubes. These capillaries all come together again into large tubes, and these tubes carry the blood back through the right side of the heart to be made pure as before."

"So it keeps going all the time, doesn't it?" said Jack.

"Yes."

"Just where is the heart put?" asked Florence.

"Between the lungs, nearer the left side than the right, but almost in the middle. The lungs partly cover it. Like the lungs, it is covered by a skin or membrane. But this is enough for to-day," I said, as I saw the children looked tired and excited.

"I believe this is the funniest lesson we've had yet," said Jack, as they went out; "to think of that red stuff running through me, and through me, and through me, like that."

I gathered up my papers, kissed Hattie, and went home to dinner.

CHAPTER VI.

THE BLOOD AND THE WAY IT GOES AROUND.



WISH I could make you know my daughter Florence.

I can see her now as she ran up the gravel walk that June day. Her golden hair was soft, silky and wavy. It fell over her shoulders and glistened in the sunlight. Her eyes were blue; not dark, but clear. Her skin was fair, and there was a pink tinge on her cheeks. Her nose turned up too much, and her mouth was too demure in its expression. These were the only faults in face or figure. But these words describing her appearance can tell you nothing of the spirit within her, neither can they make you understand the common-sense which was a part of her character. She did not do foolish things.

No one could get the knots out of Jack's kite-strings so well as Florence. Hattie must consult Florence about every new doll's toilet. Even Arthur, though older than Florence, would often run over to have a button sewed on or a book covered. Florence had faults, but she was steadily trying to conquer them.

This June morning was warm, but the shade of our elm-trees was broad, and the yard looked cool and inviting. I sat by my window and watched Florence as she walked rapidly up the path. She looked much excited, and not waiting to come through the door, stepped into my room through the window which opened on to the porch.

"O, mamma!" she said in an excited way, "I was down at the gate a minute ago and what do you suppose I saw? There is a woman lying there. I don't know whether she is asleep or dead, something is the matter. Sitting by her is the loveliest boy you ever saw. He has light hair and big blue eyes. He looked at me and said,—'I tan't wake my mamma up, and I'z hung'y.'"



FLORENCE.



"It made me cry to look at him. I told him to wait a minute and I would get him something, and I ran to you as fast as I could. What shall we do?"

I told her to get some bread and butter and fresh milk, and we started for the gate. They were there as Florence had left them. The woman was quite young, with a sweet sad face. Her clothes showed that she was poor, but they were neat and tastefully made.

She lay under one of the elm-trees. Her eyes were closed, and she was so motionless that Florence might easily have doubted whether she was asleep or dead. I soon saw that it was the unconsciousness of exhaustion. The boy beside her looked about four years old, with a fresh childish face and large wondering blue eyes.

"Haz 'oo bwo't my b'ed and butter?" he said to Florence as we came near.

"Yes," she answered, "and some nice milk, too; come and drink it."

"I'z glad, toz I'z hung'y," and he quickly began

to eat. He showed no fear of Florence, but he looked at me a little frightened.

"Won't you come with me and find the ducks and chickens?" Florence asked.

"Won't my mamma 'ake up and want me?"

"I'll take care of your mamma," I said. "You go see the chickies and horses with Florence."

"Is 'oor name Fawence?" and he looked in a trustful way into her face, and put his hand in hers.

"Yes; and I've got a brother Jack. We'll find him."

He did not hesitate longer, but trotted off well-contented.

After they were gone I sent for a camp-bed. The servants laid the mother on it, and took her to the house. We put her in a cool room on a comfortable bed, and I carefully gave her stimulants. I was rewarded by soon seeing the large brown eyes open and look at me.

"Where am I?" she asked. "Where is Robbie?"

"You are with friends," I answered, "and Robbie is just outside the window."

"Are you Mrs. — Alice — Blake?"

"I am."

"I have a letter for you," and she tried to rise and find her pocket. She could not do so, and I found it for her. The handwriting was that of my sister who lived in the West. The letter told the woman's story.

"The bearer of this," my sister writes, "is one whom I want you to help. Her husband was a drunkard and a cruel man. Her son ran away from home five years ago, hating his father and declaring that he would never come back. The mother has heard since that he went East, and is living in your village. A few months ago her husband died in a fit of delirium tremens. I fear that she will not live long; she has had consumption for two years. Her one wish was to find her son before she died. We gave her money for her journey, and I have sent her to you, knowing that you will help her. If she dies, do not fail, sister, to see that precious Robbie is taken care of; we all love him."

"How old is your son whom you want to find?"
I asked.

"Twenty-three."

"Did he have any trade?"

"He was a machinist at home."

"What is his name?"

"George Burbank."

I started; the name was familiar. I had heard Mr. Harmon speak of him as being one of his men.

She smiled, for she saw that I knew of him.

"You can tell me something of George?" she said, and a flush rose to her cheek.

"Yes," I answered, "I am glad I can. He works in the machine shop of a neighbor of mine. He is one of his best men."

"My work is finished," she said, closing her eyes and sinking almost exhausted into the pillow. "I thought — if I could find George — and if he was a good man — I would not ask God for anything else — George, my boy — will take care — of his little brother — when — I — am — gone. Robbie — Robbie" — she murmured.

Her strength was leaving her fast, but I gave her more strong stimulants and she roused.

"You shall soon see George," I said; "I have sent for him."

He soon came. I had sent him the letter, and so prepared him for the meeting. I left them alone, and I do not know what passed between them.

When I went into the room again their hands were clasped and tears were rolling down his cheeks. He was a fine, strong-looking man, and I wished that the mother might live to know him better. But it was not to be so. Rousing herself for a last effort, she said,— "Take care of Robbie, George, and, oh! my son, my son, do not forget that the last words your mother said were these: Let the wine-cup alone. Your father died the death of a fiend. Tell—my—Robbie," she said, turning to me, "that the angels—have taken mamma—to the bright world—she has told him about."

That was all.

We closed her eyes, and strong sobs shook the form of the man as he looked at her.

"She was young and pretty eighteen years ago. I remember well," he said. "God help me to be worthy of her."

We thought best to lay her quietly away under the arching elms of our cemetery, and give to Robbie the happy thought that the angels had taken her home.

That afternoon Florence took Robbie for a row on the lake. They crossed to the other side, and while they were sitting on the bank Florence said:

"Robbie, did your mamma ever tell you about a beautiful bright world where the angels live?"

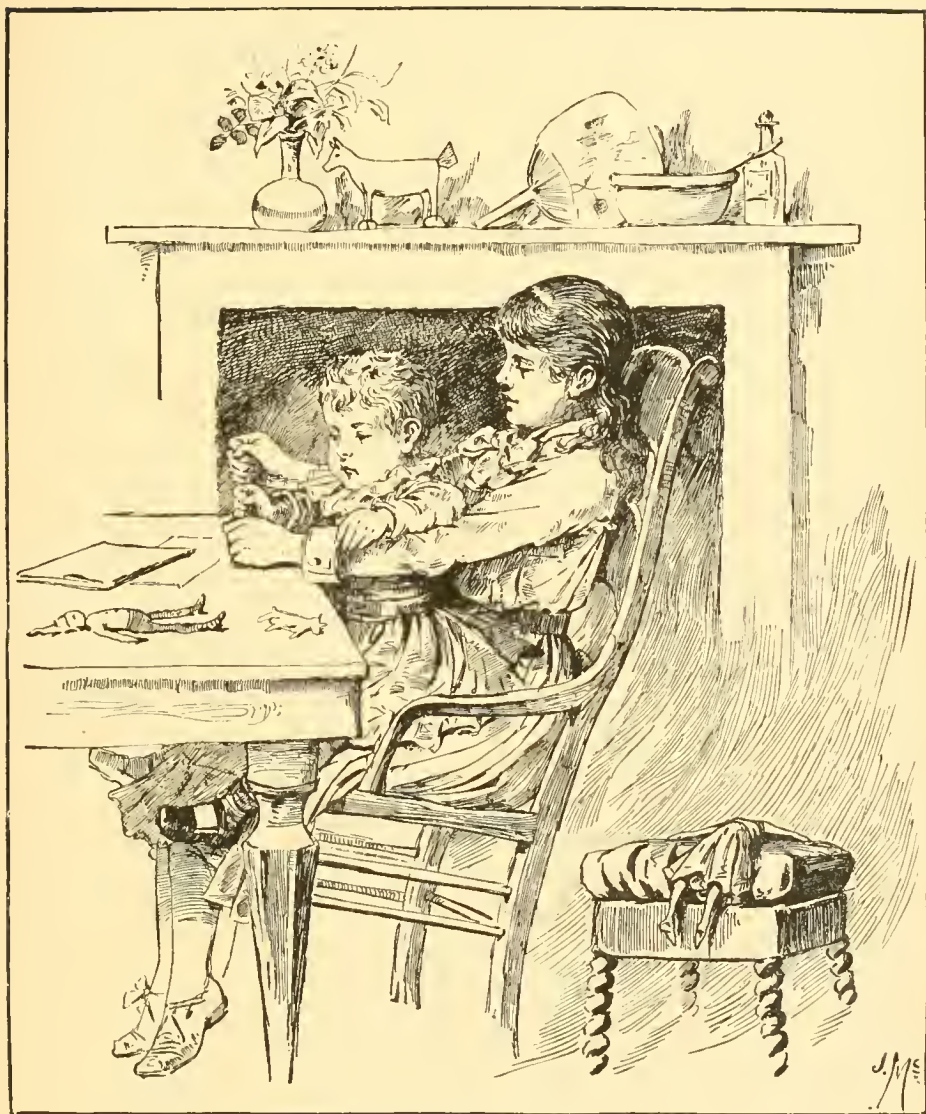
"Oh! 'es. It's all booful 'ere, 'ey sing and 'ey are dood and happy all 'e time. Where is my mamma, Fawence? Has s'e dawn 'ere?"

"Yes, dear. The angels came and took her."

Robbie looked very thoughtful

"Well, I'm glad," he said at last. "I 'ant to see my mamma anen, but my mamma 'uz very sick and tired, and may be s'e can west when she dets to ze angels house."

"Yes, Robbie; she can rest," and Florence kissed



FLORENCE AND ROBBIE.

him tearfully. "Do you want to go with the angels?"

"No," he said. "I like to 'tay here. I like to see ze ducks and chickens, and horses, and wide on ze big, big lake. Won't 'oo be my mamma, Fawence?"

"Yes," and Florence never forgot.

So it was that the blue-eyed boy came into our home, and no one ever filled the place of Florence in his heart. Day and night he was her companion.

Our next story was told under the trees in the yard. Hattie was with us and Robbie sat by well-contented with picture books and puzzle blocks.

Since the last lesson the children had asked me so many questions about blood and the things connected with it, that I concluded we would have another lesson about it.

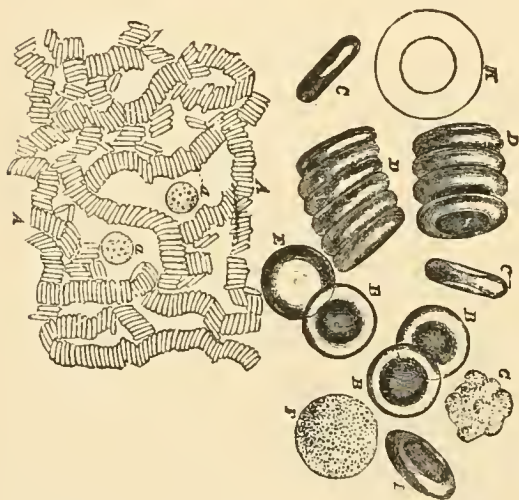
"In the first place, tell us what blood is made of," said Jack.

"Well," I answered, "blood is made of serum and corpuscles," a naughty desire to tease coming into my heart.

"O, mamma! tell us," pleaded Jack. "I don't

want to wait. I want to know right off what are serious corpicles?"

"Serum and corpuses," I repeated; "say it after me and you won't talk about serious corpicles any more."



MAGNIFIED RED AND WHITE CORPUSCLES OF THE BLOOD; *A*, CONSIDERABLY MAGNIFIED; THE RED CORPUSCLES ARE LYING TOGETHER IN ROWS; TWO WHITE CORPUSCLES, AT *aa*, APPEAR; *BCDE*, RED CORPUSCLES VERY HIGHLY MAGNIFIED; *F*, A WHITE CORPUSCLE MAGNIFIED THE SAME AS *B*; *GK*, WHITE CORPUSCLES UNDER DIFFERENT CIRCUMSTANCES.

They did so and soon learned the words. "Serum" is a liquid something like water.

"Isn't it red?" asked Florence.

"No. The corpuses are the red part."

"What are corpuses?" asked Arthur. "How do

they make it red?" he added, after a moment's thought.

"The corpuses are tiny, soft red balls. These balls are made of two different materials, but the names are so long that I sha'n't trouble you about them now."

"There must be piles of 'em," said Jack. "The blood looks all red."

"Yes. The serum is full of them."

"Can these corpuscle-balls squeeze together so that the blood can go into the little capillaries?" said Arthur.

"Yes. They are very elastic and tough, and can be squeezed into every shape."

"Why, I was thinking about it yesterday, and I thought blood was water colored with cochineal bugs," said Jack soberly.

"Well, you were a goose to think so," was Florence's wise reproof. "I wouldn't make up my mind about what I didn't know about."

"Good advice for all of us," I thought, but I said nothing.

"Besides the red corpuscles there are white corpuscles. There are not as many of these as there are of the red."

"Are they made of the same things?" asked Arthur.

"No, not exactly."

"Mamma, what makes the blood grow thick when it is cold?" asked Florence.

"There is something in the serum called Fibrin, that does that."

"Auntie, what makes the blood go round?" asked Hattie.

"It is the great muscle of the heart that does it. You remember when we were talking about the muscles I told you that some of the muscles moved whether the will told them to or not."

"Those were involuntary muscles," said Arthur.

"Yes. Well, when the blood flows into the auricles it fills them and they stretch out as large as they can be. When they are full the blood pushes through the door or valve into the ventricle. When the auricle is empty it closes and the ventricle grows large. When the ventricles are full they close and push the blood into the arteries."

"Is the push hard enough to send the blood over the body?" asked Florence.

"Yes; although the walls of the arteries are partly made of muscle and help it along."

"What are the arteries and veins made of?" asked Arthur.

"Their walls have three coats. A tough outside coat with elastic fibres in it, a second one made of a thin, brittle skin which lies in folds when the artery is not stretched out. This coat has a few elastic fibres in it."

"The muscles inside the second coat make the artery push, don't they?" asked Arthur.

"Yes."

"Are the veins just like the arteries?" asked Florence.

"Very much like them. Their walls have three coats not quite like those of the arteries. Some of the veins have little doors that keep the blood from flowing back. The muscles near these doors or valves push a good deal and help the blood to flow around."

"Does our breathing make any difference in the blood flowing?" asked Arthur.

"Not much." But I thought their heads would not hold anything more about blood, so we went in.

CHAPTER VII.

HOW WE DIGEST OUR FOOD.



“It is the oddest, quaintest place in the world.” Jack and Florence, chasing fire-flies on the lawn, heard Mr. Harmon say these words as he sat smoking with their father on the porch. The evening was a perfect one for early summer. The sun had gone away to wake up the Chinese babies, and the moon was just rising. It had formed a shining path over the lake. The light of the fire-flies was fast growing dim as the moon rose in the sky. Florence and Jack were getting tired of chasing them, and as Mr. Harmon said these words, they were seating themselves on the steps, so the former asked,—

“What is such a funny place, Mr. Harmon?”

"I was speaking of Arlington Head," answered Mr. Harmon.

"Where is it?" asked Florence.

"It is an island, lying off the coast of Massachusetts. I was telling your father about it. It is nothing but a bluff, with a fishing village on it. It is a collection of odd little houses, where people from the coast used to go in cod-fishing seasons. It has become a seaside resort lately."

"Are we going there, papa?" asked Florence.

"Mr. Harmon was trying to persuade me to send you," answered her father."

"O, yes! papa, do," said Jack. "I am tired of this little puddle of a lake; I want the big ocean."

"Yes, a boy with such tremendous ideas as you have needs a big ocean to drown some of them in," answered his father.

"Well, papa, any boy likes the sea," said Jack; Judge Blake assented.

"Alice," said my husband, as I came on the porch, "Mr. Harmon offers me a chance to rent a cottage at Arlington Head."

"For how long?" I asked.

"Oh! as long as you choose," he said.

"Will you go with us?" I asked.

"I go!" he answered; "and leave clerks, briefs, and clients; leave all the paraphernalia of a lawyer's office — no."

"Then I'll go with our children and Mr. Harmon's, and stay three weeks; you will come Friday nights, and stay over Sunday."

"Settled," he said.

As the result of this evening's conversation, Florence and Jack, Arthur and Hattie, Mary and I found ourselves a week from that evening in a boat, which steamed up to the wharf at Arlington Head. Amid the clanking of chains, the blowing of whistles, and the throwing of ropes, necessary for the stopping of a boat, we did not notice our surroundings very much until we had crossed the plank, and were standing by the side of our bags and bundles on the wharf. When we did look up we saw rather an unpromising sight. Not the light easy wagons, the graceful pony phaetons, and

the bevy of pretty girls, and admiring young men, who are generally to be seen at the seaside, watching the arrival of the boat. No; only two hacks, which had done service at least ten years, with lean horses, and six or seven box wagons. Some of these wagons had two seats, some of them three.

A jolly old man, who looked a little as if, like the island codfish, he had been salted down, and was warranted to "keep" any number of years, soon spied our party.

Coming up to us, he asked "if this was the party going to 'Jones' Cottage?'"

I answered "yes," and he asked us to follow him.

He led us to a three-seated box wagon.

I must say I wished myself at home when I saw the wagon that I must clamber into. But, for the sake of the children, I made the best of it. The boys thought it was jolly fun. The captain, for the men at Arlington Head were all captains, pulled up the backboard of the wagon, and "boosted" us in, one after the other.

Mary crawled over the two back seats to the captain's side and held Robbie in her lap. Florence and the boys took the second seat. I took care of Hattie, behind. All we could see, as we looked about us, was a waste of sand. But the box wagon wasn't so uncomfortable, after all, and my pride was quieted as I looked around, and saw other box wagons filled with people as respectable as we were.

Mary thought that, "Shure we had come to the wilds of Ameriky."

After a half-hour's drive we reached the village. The village was made up of about twenty low rambling shingled cottages. A large green pump in the middle provided the town with drinking water, and a few stores furnished provisions. The steep bank on which the village was placed rose from a wide beach of soft sand. From the edge of the bluff we could see miles of boundless ocean. Portugal was the nearest land. A heavy surf rolled and broke with its deep steady roar upon the beach.

"Jones Cottage," where our box wagon stopped

was the cunningest little house in the world. There were six little rooms in it — sitting-room, dining-room, kitchen, and one bedroom below stairs. From the kitchen we climbed a step-ladder, and on the second floor found two little cubby-holes called bedrooms. The lady who owned it had fixed it up with attractive old-fashioned furniture, and it looked very home-like and pretty.

We were all delighted. We had found the place of rest. Not a fashionable, over-crowded hotel by the “seashore,” but our own dear little home. Clear bracing salt air, splendid surf bathing, and a broad sea to look at.

Our first night was quiet, and we slept restfully. The next morning was clear and sunshiny. The boys took a tent which we had brought with us, and put it up on the beach. We spent the morning watching the surf. We reached there Tuesday, and when Friday came around we were enough at home to enjoy our lesson. Friday morning we had our bath at half-past ten, and at half-past eleven gathered under the tent to talk about the digestive

organs. I must tell you about our lesson now, and after that you shall hear more of our strange, charming little island.

"Who can tell me," I began, "the name of the broad, flat muscle that divides the hollow place inside the ribs into two parts?"

"Diagram," promptly responded Jack.

"It isn't," said Florence and Arthur both at a time, "it's diaphragm."

"Which is right, Hattie?"

"I don't remember," Hattie answered timidly, "but I guess Jack is, he most always is."

"He is sometimes," I said, "but not to-day. It's the diaphragm. Hattie, tell me what name we gave to the hollow place above the diaphragm."

"Chest," answered Hattie.

"The hollow place below the diaphragm is called the abdomen, and it contains the large organs that digest the food."

"What does digest mean?" asked Florence.

"It comes from two Latin words that mean to dissolve or separate. To digest food means to put

it into such a form that it can be taken by the blood and used to nourish the different parts of the body. What organ do we use first in digestion, Arthur?" I asked.

"We put our food into our mouths first," Arthur answered, after thinking a moment.

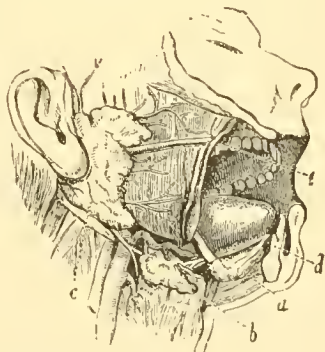
"Yes, the mouth is used first. The food starts there."

"Mamma, was anybody ever born without a mouth?" asked Jack. "If they were they couldn't live, could they?"

"I don't know whether a person was ever born without a mouth, but if they were they could live a long time. Food that is liquid could be taken in through the skin."

"Could they have broth baths?" asked Jack.

"Of course; broth baths are given to many sick persons. I'll tell you more about that later. In the mouth we first make our food fine with our



THE POSITION OF THE SALIVARY GLANDS: *a-b-c* ARE THE GLANDS WHERE SALIVA IS FORMED.

teeth. The mouth is lined with a pink smooth membrane called mucous membrane. Under this membrane lie some little hollow sacs called glands. There are a good many of these glands, and they have long, hard names that we will not try to learn now; they are all the time making a kind of liquid that is called saliva. The saliva flows into the mouth through little hollow tubes."

"That's what makes our mouths wet, isn't it?" said Florence.

"Yes. When our mouth is not filled with food the glands make only enough saliva to keep the mouth moist, but when food comes into the mouth they make a great deal. Jack, can you tell me what the saliva does to the food?" I asked.

"It makes the food soft, so it can go down into the stomach, I should think," Jack answered.

"Yes. After we have chewed it, and it has become soft with the saliva, we push it on to the back part of the tongue. Here some muscles draw up and send it down past the soft palate into the pharynx."

"Is pharynx the same as the larynx?" asked Jack.

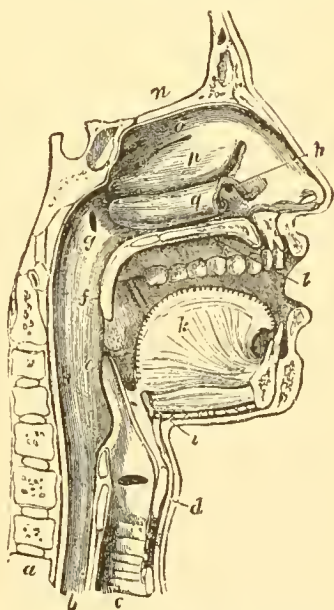
"No; the pharynx is a tube that goes down from the back of the nose. It lets food pass into the stomach, and air pass into the larynx through the passages of the nose."

"I should think the food would go into the larynx," said Arthur.

"It would, but the larynx has a door that shuts when the food is passing. After the food has passed through the pharynx it reaches a tube called the œsophagus. This tube has strong muscles in it. These muscles draw up and push the food down into the stomach," I replied.

"Is there a hole in the diagram to let the œsophagus through?" asked Jack.

"Jack, don't say diagram any more; it's too ridiculous," said Florence.



A SECTION OF THE MOUTH AND NOSE :
a THE WINDPIPE ; *b*, THE GULLET, OR
 (ESOPHAGUS. THE LETTERS *g-f-e* ARE
 PLACED IN THE PHARYNX.

"O, bother," said Jack; "I can't remember.

"Yes; there is a hole in the muscle for the œsophagus to pass through. The œsophagus opens into the stomach," I went on. "The stomach is an elastic bag, larger in one part than the other. It lies more in the left side of the body than the right. It is lined with a membrane which is pale pink when the stomach is not at work, but this membrane becomes red when the stomach is working, from some blood vessels that grow full of blood."

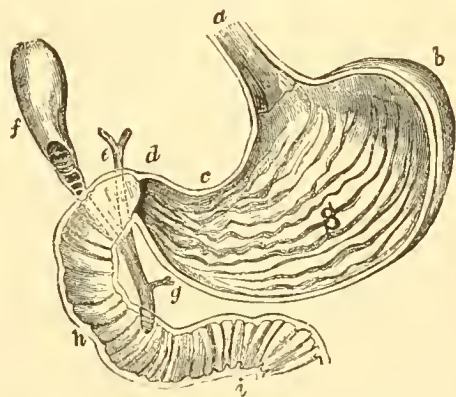
"How does the stomach work?" asked Florence.

"Under this membrane are some little glands. When food goes into the stomach these glands begin to work, and work as fast as they can. They make a liquid that is called gastric juice. This liquid joins with the food, and makes it much more soft than it was before. Some kinds of food it changes entirely."

"Why is the stomach elastic?" asked Jack.

"To hold our dinners when we eat too much," I said. "The material that is made by the mixing

of the gastric juice with the food is called chyme," I went on. "This chyme leaves the stomach by a door, and passes into the small intestine or bowel. The small intestine is a very long tube that lies coiled up in many coils in the abdomen. Here it meets some more juice, bile from the liver, and some juice from a large gland called the pancreas. This last kind of juice is very much like saliva. These juices make the food still more soft. After it has mixed with the juices of the intestine it is called chyle. This finishes the process of digestion."



INTERIOR OF THE STOMACH AS SEEN FROM BEHIND:
a, THE OESOPHAGUS, OR GULLET; *h-i*, THE SMALL
 INTESTINE; *S*, THE STOMACH; *g*, THE TUBE FROM
 THE PANCREAS.

"How does the food get into the blood after it is digested?" asked Arthur.

"Some little glands called lacteals take out of the small intestine the parts that are needed by the blood. The parts that the blood cannot use

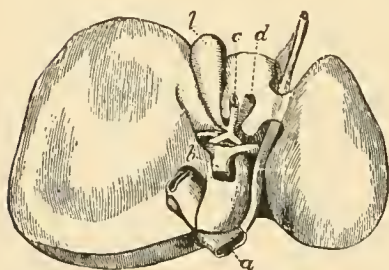
pass on into the large intestine. This is a tube that is joined to the small intestine, and lies around it. From this tube they pass out of the body."

"I've seen livers, haven't I?" said Hattie.

"I expect so. Do you know what makes it such a dark color?"

"No, ma'am," they answered.

"It is filled with large blood-vessels. It is a



THE LIVER: c, THE TUBE THAT CARRIES THE BILE TO THE SMALL INTESTINE.

large organ placed in the upper part of the right side. It is all the time making bile — a greenish yellow bitter juice. This flows into the small intestine through a tube that leads

into it from the liver," I said.

"Where is the pancreas?" asked Florence.

"The small intestine makes a large curve after it leaves the stomach, before it begins to coil. The pancreas is fitted into that curve."

"I should think the stomach would move around, the place where it lies is so much larger."

"It is fastened in by straps."

"Nothing has been forgotten, has it, mamma?" said Florence.

"No."

"Mrs. Blake, can any kind of animals live on stones?" asked Arthur.

"No. All animals must have food that has life in it."

"Well," he went on, "uncle John lives in South America. He had a pet ostrich that used to stay in the yard. One day the girl hung out a large washing and the ostrich ate off every button from the things."

"That may be, but you may be sure that every button that went into the stomach of the ostrich went out of the large intestine. It is true, though, that some birds swallow stones to help grind the food in the stomach."

But the large bell sounded from the bluff for dinner at the hotel, and we gathered up our things and went into the house.

CHAPTER VIII.

THE LYMPHATIC SYSTEM.



HERE were pleasant walks around the Island. In many places there was a carpet of trailing vines for us to walk on. Bright pink roses, red lilies, and sweet-scented azaleas could be found growing wild in many places. Sweet fern made the air fragrant with its odor.

Next lesson day we took a long walk and found a spreading tree. We sat down here and did our work.

We talked about the lymphatics.

"I didn't know we had such things as lymphatics, mamma," Florence said. "What are they?"

"They are a system of tubes and capillaries like the veins and capillaries that hold the blood."

"Are they as large?" asked Arthur.

"O, no! the largest is no larger than a small quill, and the small ones no larger than threads."

"Do they have anything in them?" asked Jack.

"Yes; they hold a yellowish white liquid called lymph. But I must tell you more about them. They start in the different parts of the body in tiny capillaries, lots and lots of them. After awhile they join and form larger tubes. These larger tubes join and form one large one that goes straight up the centre of the body."

"Where do they go then?" asked Hattie.

"This large one divides again near the neck, and one part joins the large vein at the left side and the other at the right side."

"What good are they?" said Jack. Jack didn't believe in any useless organs.

"Well, you see that after the food has been digested it has to get into the blood in some way."

"Oh! These carry it, don't they?" said Jack again, jumping at his conclusions as he was too apt to do.

"Not exactly. They take up the chyle after it

has been digested in the small intestine, but they do other things besides this."

"What kind of things?" asked Florence.

"Absorbing things. They lie all around by the side of the blood-vessels. Lying in this way they can absorb, that is, drink in, whatever is not needed in the blood to nourish the body."

"What do they do with the chyle?" asked Arthur.

"They unite it with other things that they absorb from different parts of the body, and it makes the fluid called lymph."

"What becomes of the lymph?" asked Jack.

"It is carried through the small lymphatic tubes to the large one, and from that empties into the veins to unite with the blood and be purified through the lungs."

"Are the lymphatic tubes made like the veins?" asked Florence.

"Yes; very much like the veins. They have valves in them like the valves in the veins, and the lymph flows only one way. That is toward the neck."

"How do they absorb?" asked Jack.

"They do their work partly through their walls, and partly where the lymph-capillaries join the blood-capillaries."

"Is there anything else funny about them?" asked Jack.

"Yes. There are little glands that they go through. Some of these glands are about as large as a pea, some as large as an almond."

"What's in the glands?" asked Arthur.

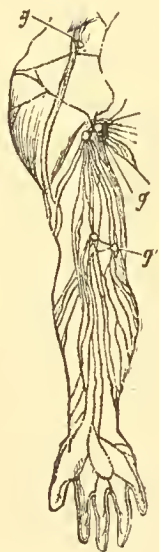
"Little things that are lymph-corpuscles. They are very much like the white-corpuscles of the blood."

"Do the glands put them into the lymph?" asked Florence.

"Yes; or rather the lymph gets them when it flows through the glands. They unite with the lymph and flow into the blood."

"Do animals have lymphatics?" asked Arthur.

"Yes; some have what are called lymph-hearts, which pump the lymph around as the heart pumps the blood."



THE LYMPHATICS
OF THE FRONT
OF THE RIGHT
ARM: *g*, LYMPHATIC GLANDS,
OR GANGLIA AS
THEY ARE SOME-
TIMES CALLED.

"Well, I don't see as they do much good," said Jack.

"O, yes! They take up and carry back to the blood a great many things that would be wasted if they were not there."

"Well! I don't think they are as nice and funny as some things, like the nerves and heart, anyway," he said quietly to himself.

"The lymph-vessels that are found in the small intestine are called lacteals, because they hold the milky-looking chyle. Lacteal comes from a Latin word meaning milk."

"I suppose the chyle flows into the blood with the lymph, doesn't it?" said Arthur.

"Yes."

"Mrs. Blake, I don't see how people can go on every day and never think about their bodies," said Arthur.

"I don't see either, Arthur."

"Couldn't a great many diseases be saved if people only knew, and would think," he went on.

"Yes. I am telling you these things because I

want you to know and think. Some children came to me yesterday and wanted to eat some green peaches. Did they know about that poor stomach that never would have known what to do with such dreadful things?"

Jack and Arthur looked sheepish, and Hattie "gussed they were the children."

But we had a walk before us and we were hungry, so we put up our papers and went back to the cottage, where Mary and Robbie had a good lunch ready for us.

"Lymphatic day," as Florence called it, was a day that we have not forgotten. Our usual hour for bathing was five o'clock in the afternoon. Jack found us about that hour on this day sitting on a bench at the edge of the bluff.

"Hurrah for a ducking!" he called out as he came up to us.

"I think we would have one in earnest, Jack, if we went in to-day," Florence said. "Look at those waves!"

"O, you pickaninny! everybody's going in."

Sure enough. One after another the bathers were leaving their cottages and going to the beach.

It was a great temptation; I yielded against my better judgment, for the waves towered like mountains.

We went to the house and put on our bathing suits. Arthur and Jack had no fear in any surf. They were swimmers, and there seemed to be no danger for them. They would mount the highest waves and laugh when they reached the top. With Florence and myself it was different. We clung tight to the rope.

We did not intend that afternoon to go beyond the place where the waves broke on the beach. We laughed and jumped as they covered us with sand and seaweed, and did not realize that we were stepping too far.

A wave higher than the others rolled slowly in.

We watched its coming, but did not realize its power until it was just upon us. We turned to run from it, but it was too late. It caught us as it rolled over and whirled us under the rope. Before we could get on our feet again another, and yet another, had rolled in and swept over us.

In a moment we must have loosed our hold.

It was Jack, impulsive, reckless Jack who saved our lives. He was swimming near and saw our danger. With the cool determination which a crisis sometimes gives to such natures, he thought how he would save us.

No more than three high waves usually follow in succession. He knew this fact, and while the third was breaking swam close to us. With strength greater than it would seem possible in so young a boy, he caught hold of both of us and pushed us on to our feet up beyond the reach of the breakers.

Florence was unconscious, and as the wave carried her on to the beach he thought she was dead and fell fainting beside her. But friends were at hand. Others had been bathing near us, and some sitting on the beach. They administered restoratives, and we were soon ourselves again.

Two or three poems were written to Jack by enthusiastic maidens, and he became the lion of the day.

To me, it was no revelation of Jack's character.

I knew that the qualities were there,—the courage, the wisdom, the determination necessary for such a deed. It needed only danger to those he loved to bring them to light. I quietly thought these things when people said,—

“What a remarkable son you have, Mrs. Blake; who would have thought it of that reckless child!”

Jack merely said:

“I wanted mamma to mend my stockings, and Florence to tease. What’s the use of making such a fuss about it?”

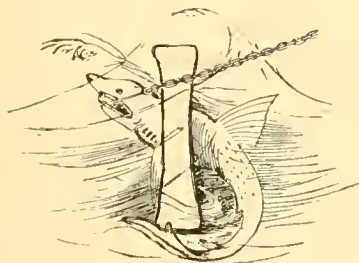
An old sailor who had made ten whaling voyages to the Pacific, shook his wise head and said—

“Don’t be foolin’ with them breakers, Mis’ Blake. Ye can’t put no dependence on ’em.”

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CHAPTER IX.

OUR NERVES.



It was not considered respectable to leave Arlington Head without having caught a shark. Boys must not only catch a shark, they must cut out the jaws, upper and lower, and have these jaws boiled until they were very soft. When the jaws became soft the teeth would easily come out. These teeth would look a little fierce, but they would be very white and pure. The boys must bore holes in these teeth and string them into necklaces for the girls, thus presenting trophies of their valor.

Arthur and Jack would not be outdone by the other boys on the island. Florence and Hattie should have necklaces. So the young people soon

began to beg me to go out to Woonsocket, the hunting ground of the shark. I felt a little "game" myself, I had heard so much about the sharks, and was quite willing to call on our captain and ask him to take us to Woonsocket. He came one morning with his box wagon, and we "piled in."

The island was much the shape of a swan. The village was situated on the body of the swan, and towards the right of the body curved a long neck of land. The water inside this curve formed what is called the "inner harbor." The outside was a coast of the open sea. At the narrowest part of the neck an eating-house had been built, and boats for shark fishing could be had there. The land was scarcely a quarter of a mile wide. On one side was the quiet rippling water of the harbor, each tide leaving glittering shells upon the beach. On the other side the ocean, and the white line of surf. Just outside of this neck in the open sea played the sharks. They were not the man-eating species, but they were five or six feet long and very fierce. The shark boats were owned by young

men who went out with parties, and we soon got possession of one.

Hattie was not strong enough to attempt the excitement, but Florence and Arthur, Jack and I, jumped in and pushed off over the surf. In the boat we took a strong iron hook with meat on it. Fastened to this hook was a chain, and attached to the chain was a large coil of rope. The two young men, guides of our party, rowed us out about a mile, and then directed us to throw out the baited hook. Arthur did so, and we did not wait long before we saw sure signs of a nibble.

The rope slowly began to move.

"We've got a fellow," said one of our guides.

Arthur had quiet patience. He could enjoy the progress of the sport, but it required all my power of command to keep Jack from jumping overboard with excitement when he heard the words. The rope began to uncoil. It was very long and was fastened to the seat of the boat. The shark was evidently eating his meat, and had not discovered the enemy that lay concealed in the savory meal.

But soon the hook fastened itself, and like lightning the fish was off. He travelled rapidly as far as the rope would let him go. Then came the tug. Arthur was determined to pull the first one in alone, if he could. It took all his strength, for the fish was a big one, and Jack had to help him at last. But together they did it, the perspiration pouring from their faces. Florence screamed and would have hidden her face as the monstrous flopping creature was drawn over the side of the boat. Our guides had a club ready and gave him a blow that stunned him just as his head appeared. They then killed him and towed him to land.

We went out for a second one, and Florence and I tried our strength to bring him into the boat. It was no light labor, but we did it. The flesh of the shark is not used at all for food. It is too coarse. There is some fat on the body that is used for oil, but he is of little service to man. I felt sorry afterward that we had been so cruel, just for sport's sake. Perhaps Mr. Bergh had better station men at the shark fisheries.

The boys cut out the jaws, but the rest of the carcass was left on the sand. Hattie was waiting, and had a basket full of white and glittering shells to show us. She also had specimens of seaweed colored the most brilliant green. We enjoyed our dinner of clam-chowder and boiled blue fish. In the afternoon a good bath in the quiet water refreshed us, and we rode home well satisfied with our day at Woonsocket.

I did not mean to worry the children with the lessons about their bodies, but my mention of putting it off met with such a groan of disapproval that I said no more about it.

"Why, mamma," said Jack, "these lessons keep me from being poky. When I haven't anything else to do, I just go to the cupboard and take bits of bread and then follow it along to see what becomes of it."

"Well," I said, "on Friday I'll tell you something about the nervous system."

We met under our tent on the beach, the girls adorned with the necklaces of sharks' teeth.

"The nerves," I began, "are telegraph wires from the mind to the body."

"What is the mind, mamma?" said Florence.

"All I can tell you, Florence, is, that it is the part of us that does the thinking."

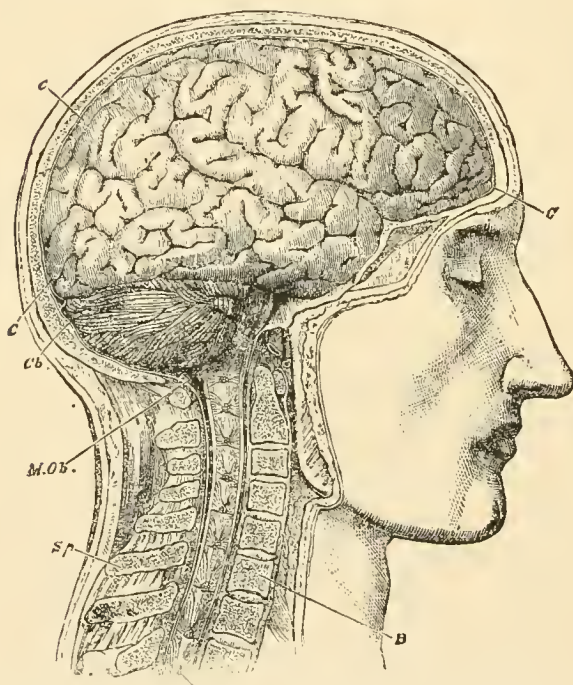
"It's in our heads, isn't it?" said Arthur.

"What makes you think it is?"

"Because we don't think when our heads are cut off," answered

Arthur with great promptness, to which I replied, "That is not the only reason, but it will do for the present."

"Does it just lie around loose inside the head bones?" asked Jack.



A SIDE VIEW OF THE BRAIN AND UPPER PART OF THE SPINAL CORD: *c-c*, THE FOLDS IN THE CEREBRUM; *C-b*, THE CEREBELLUM.

“Be still, all of you, and let me get started. Inside of the skull—that is the name given to the bones of the head when they are taken all together—is a soft substance called the brain. It is made of two kinds of material,—soft pulpy gray matter, and white fibrous matter. It has many different parts. Fastened to the bottom of the brain is a long cord. This cord is made of gray and white matter like the matter in the brain.”

“Oh! that is the spinal cord, and it runs down through those holes that you told us were in the backbone; doesn’t it?” said Florence.

“Yes,” I answered; “and do you remember that I told you about some little holes that were in the sides of the backbone to let the nerves go through?”

Florence remembered, and told the rest about it.

“Well, through each one of these little holes nerves go out from the spinal cord.”

“Are they as big as the spinal cord?” asked Arthur.

“O, no! The nerves are not larger than threads. In the centre is a gray thread called the axial band;

around this is a soft white substance called the medulla, and outside is a very soft membrane that covers these. This is called the sheath. These nerves branch out and go all over the body."

"Are they as thick as the blood-vessels?" asked Jack.

"Yes."

"What good do they do?" Jack went on.

"You could not know anything, or move without them."

"Please tell us how it is," asked Arthur, his big eyes growing bigger.

"There are two sets of nerves," I said. "One set tells the limbs and all outside things what the brain wants them to do. The other set tells the brain about things from outside. Touch this book."

They did it.

"The nerves of your eye are set in motion by the rays of light from the book. The nerves at the end of your finger are set in motion when you touch the book. Quicker than lightning the motion travels to the brain, and you know that it is a

book and not anything else. Which set of nerves does that?"

"The set that tells the brain about outside things," said Arthur.

I told him he was right.

"Now move your first fingers," I said. They wiggled them. "What moves the fingers?"

"Muscles," answered Jack

"Well, what makes the muscles go just now instead of a minute ago?"

"Oh! the brain wanted them to go, and the nerves told them what the brain wanted. Wasn't it so?" said Jack.

"That's exactly the way. Florence, which set of nerves did that?"

"The set that tell outside things what the brain wanted," she said.

"Right."

"How do the nerves do this, mamma?" asked Florence.

"They do it by motions."

"How?" said they all.

"In one set of nerves the motion begins at the end of the nerve, in the other at the brain."

"What makes us have different feelings?" asked Arthur.

"Different kinds of motion; that is, motions that are faster or more slow. Every color and every different thing that we see makes a different motion."

"How does just motion do it?" said Jack, with astonishment visible in every feature.

I could only answer, "I don't know."

"Well, I shall have a great many questions to ask God when I see him," he continued.

"If the muscles and heart and lungs and everything were in the body, and the nerves gone, couldn't the body do a single thing?" asked Arthur.

"No."

"Could the nerves do anything without the brain?" asked Florence.

"Yes. The spinal cord has power to act when the nerves that lead from it are excited by other things than the brain. We swallow without willing

to swallow after the food reaches the back part of the tongue. The nerves of the pharynx and œsophagus are excited by the food that strikes them. A frog swims after its head is cut off if it is thrown into the water. The water excites the nerves."

"I can hardly believe it," said Arthur.

"It's true. You can try it."

"Won't you please tell us more about the brain?" asked Hattie.

"The brain is of a light-gray color, and looks inside the head as if it were lying in a great many folds. There are many different parts which have long, hard names."

"What is the name of the thinking part?" asked Arthur.

"The cerebrum," I answered. "It is the upper part of the brain, and much the largest part. The folds in it are very deep, and it looks just as if it were cut down right across the middle of the head just where a little girl parts her hair when it is parted straight. Each of these two sides seems to have the same power."

"You said it was made of gray and white pulpy stuff, didn't you?" said Jack.

"Yes; it is white, fibrous matter on the inside, and gray on the outside."

"Which thinks, the gray or the white?" asked Florence.

"The gray has the life power. The white simply carries the power to other parts of the body."

"How do they know that just the cerebrum thinks?" asked Florence; "they can't cut open a man's head to find out."

"No; but they cut open dogs' heads, and rabbits' heads, and chickens' heads to find out."

"Live ones?" they all asked together.

"Yes."

"Well, I think that's perfectly awful!" said Florence with tears in her eyes.

"Yes," I said, "it seems awful, but think, my dears, a little more about it. In the first place they almost always stupefy the animal with chloroform, and if they did not, is not the knowledge that men may get worth more than the pain of a few animals?"

"Mamma, I think it is funny for you to talk this way," said Jack. "You won't even let us kill a little bit of a bug."

"Jack, if by killing a little bug or a big one you could learn to cure the dreadful diseases of the brain, or to make insane people well, you might kill a hundred. I think, however, it is very wrong to kill them only for sport."

"I don't think I could believe in it," said Florence.

"Don't make up your minds till you are older and have thought more about it. Men find that if they cut out the cerebrum of a chicken, but leave the rest of the brain, the chicken can do everything that it is made to do; that is, it can eat if food is put into its mouth, fly if its wings are moved; but that it can do nothing until it is forced to do it. It would stand perfectly still and stupid as long as it was alive, and then starve to death."

"Please tell us about the other parts of the brain," said Florence.

"Below the cerebrum and part way under it, is a smaller part, called the cerebellum. It has gray matter outside and the white matter inside. The white matter is put in in a beautiful way. If you cut the cerebellum open you can see what seems to be white branches. They are called arbor vitæ."

"That means tree of life," said Arthur. "I learned it in school."

"What does the cerebellum do?" said Jack. "Do they know from chickens?"

"Yes. If they cut out the cerebellum of a chicken it knows everything, but it cannot do what it wants to. It cannot walk, cannot fly, cannot pick up its food or eat. It tries in a wild way to do these things, but it cannot control its motions."

"Why, mamma?" asked Jack.

"Because, my dear, it is supposed that the cerebellum has something to do with the muscles, and helps us to make the muscles go straight when we walk and run and pick up things."

"And helps the chickens to fly straight," continued the boy.

"There are parts of the brain that control all the senses. They are sight, hearing, and smell; and there is a speck of a place, just above the neck, which cannot be even pricked without causing instant death."

Jack looked as if he were determined to find it, and try to see if what I said were really true.

"Are there any nerves that don't come from the spinal cord?" asked Florence.

"Yes. There is a system that controls the motions of the abdomen and the organs inside. It is called the sympathetic system."

"Mamma, I see now why you said that the nerves were telegraph wires. The brain is one station, the body is the other, and the nerves are the wires. Isn't it so?" as the big bell sounded.

"Bother on that dinner-bell," said Jack. "I wanted to know lots more things. I think the nerves are the very nicest things."

"We'll hear more sometime, but you wouldn't like your nerves if they got too tired talking and thinking about themselves."

CHAPTER X.

THE EYE.



UR three weeks had gone by. The island had proved more attractive than we had expected, but there was a lonely papa in our lakeside home, and we wanted to be with him. We bade farewell to our captain with his box wagon, and, with fair promises to return the following summer, we began our homeward journey.

Grass, elm-trees, and mountains seem more beautiful than ever after one has been looking at barren sand and blue sea. Our home looked very charming as we returned to it that August evening. The "puddle of a lake" looked lovely, even to Jack, and we settled down to our pleasant home-life again well contented.

George Burbank had prepared a pleasant surprise for the children. He was a practical machinist, and had been at work for a long time on an engine which, when it was finished, would be about half the size of an ordinary engine. He had completed it while the children were away, laid the track around one of their father's fields, and put an old wagon-box on car-wheels for a car.

The morning after we got home he invited us to ride. Puff, puff! toot, toot! We went around the field at the rate of two miles an hour. The children shrieked with glee, and before the summer was over the boys were expert engineers.

"Mamma," said Jack, one day, as we sat down to our lesson, "papa is the funniest man! The other day I asked him what my eyes and ears were. He told me they were 'end organs.' I asked him what 'end organs' were, and he told me to ask mamma. Are they end organs?"

I laughed, and told him that papa was right. Each nerve has at its end what is called an "end organ." In the smaller nerves this end organ is

only a little loop or branch where it receives the motions that it carries to the brain, but the larger nerves have large organs at the end like the eye and ear and nose, and the nerves of taste on the tongue.

"But I don't see how the eye is an end organ, anyway," said Jack.

"I think I do," said Florence, with a little hesitation.

"Tell us, if you do."

"I think that the nerves of the eye carry the things that we see to the brain."

"A big load they'd have, you goose," said Jack, glad of a chance to trip up his careful sister.

"Mamma, Jack's a hateful thing," said Florence tearfully. "You know what I mean."

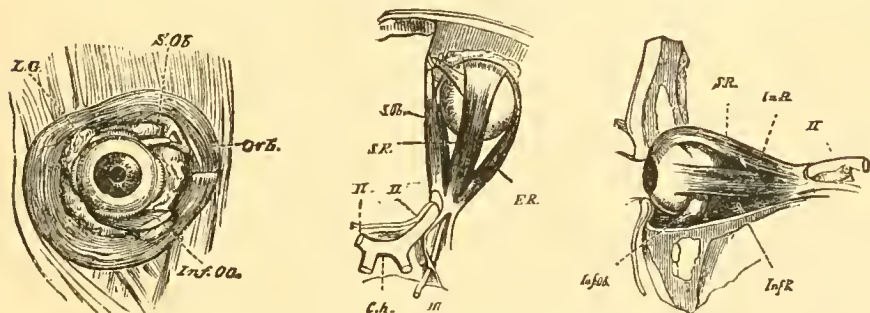
"You had better say what you mean," Jack quickly retorted.

Florence was beginning to ask him about his "diagram" when I saw it was time to stop them. I told Florence that two words were needed to make her sentence right. The words were "picture of." "Where will you put them, Florence?" I said.

"Oh! I see," she answered, still tearful. "It is the picture of the things we see that the nerves carry to the brain."

"You're right now. So the eye is an end organ. Now we must see how the eye is made."

They all began to look at one another's eyes,



THE EYEBALL AND THE MUSCLES AROUND IT.

but they could not tell much about it from that.

"Who can tell me the shape of the eyeball?" None of them knew, so I had to tell them that it was nearly round like a ball.

"What makes the white of the eye?" asked Florence.

"It is the outside covering of the eyeball, and looks white as you see it in the eye. It is called the sclerotic coat."

"There's another name that it breaks a fellow's jaws to pronounce," said Jack. "What on earth do they mean when they say 'slercotic'?"

"They mean that it is the hard coat," I answered. "S-c-l-e-r-o-t-i-c is from a Latin word meaning hard or firm."

"This white coat doesn't cover the front of the eyeball, does it?" said Arthur, who had been studying Jack's eye.

"No; it ends where you see it end, around the edge of the dark part of the eye."

"What covers the dark part?" asked Hattie. "It is something that looks like glass."

"It is clear like glass, and it is called the cornea. The word cornea comes from a Latin word meaning horn, and this membrane has this name because it is strong like horn. It is round, you see, and it is joined to the sclerotic coat."

"Doesn't it bulge out in front?" Jack asked.

"A little."

"What's inside?" asked Florence.

"Inside of the white covering is a black cover-

ing. This coat is called the choroid coat. That word means a coat that looks like a kind of skin or leather called corion."

"Is that the dark part of the eye?" asked Jack.

"No; you cannot see the choroid coat at all. It ends in some muscles that go all around the edge of it."

"What are the muscles in the choroid coat for?" asked Florence.

"They have something to do with our being able to see at different distances."

"Well, what is the dark part of the eye?" said Jack.

"Wait till I come to it, my boy; we are talking about the coverings of the eyeball now."

"I should think two coverings were enough," he went on.

I didn't argue the matter with him, but said, "The third covering is inside both the others, and is called the retina. This coat is made of a network of nerves. The word retina comes from a word meaning net."

"How does the nerve get to it?" asked inquisitive Jack.

"There are holes in the outside coats to let them through."

"The nerves come from the brain, don't they?" asked Florence.

"Yes. Inside the brain are two large bodies of nerve-matter that control sight. From these bodies a large nerve goes to each eye. These nerves are called the optic nerves. They go through the coats of the eyeball and spread out in the retina. And now I will tell you about the dark part of the eye that we can see. That black place in the middle is a hole."

They were all surprised at this. Hattie didn't think it looked like a hole.

"What is it for?" asked Jack, as usual.

"To let the rays of light in. They fall on the retina clear back in there. The light makes the nerves begin to move, and so, by this motion, the knowledge of the thing we see is carried to the brain. Around this little hole is the iris. Jack and Arthur

have brown irises, and Florence and Hattie blue. Robbie's are blue, too."

"What about albinos? They have pink irises," said Florence.

"Yes. In an albino the choroid coat is not colored black at all, and the iris is not colored. There is a muscle inside the iris to make it grow larger and smaller."

"But, mamma, what is inside the coverings? is it hollow?" asked Florence.

"No. It is all filled up. Between the cornea and the iris is a salty liquid like water, only thicker."

"Doesn't it run through the pupil?" Jack asked.

"Yes. It fills up all the space it can find. It is called the aqueous humor. Aqueous means watery.

"Behind this, and behind the iris, is a membrane clear and soft, but harder than the aqueous humor. It is rounded out on both sides; more at the back than in front. It is called the crystalline lens. Because it is shaped like a lens, and is clear as crystal, I suppose.

"Behind this, and filling up the rest of the

eyeball, is a clear soft substance called the vitreous humor."

"Vitreous means glassy, doesn't it?" asked Arthur

"Yes; and the humor is called vitreous because it looks like melted glass."

"What keeps the ball in?" asked Jack.

"Six muscles fasten it to the bone around the eye and move it."

"What makes us cry?" said Hattie.

"Bumps!" said Jack, under his breath.



L.G., THE LITTLE SAC OR
GLAND THAT MAKES THE
TEARS.

"There is a little sac or gland above the eye that has an opening in the upper eyelid. This gland makes tears all the time. When we wink the eyelid brings the water over the eye so as to keep it moist. When we cry tears are made a good deal faster."

"What awful big ones girls must have!" was Jack's unkind remark.

"I suppose the eyelids and lashes and winkers are made to keep the dust out of the eye, are they not?" asked Arthur.

“ Yes ; but we have had a long lesson, we must stop now.”

“ Come on, Arthur ! ” said Jack. “ Let’s dig the old cow’s eye out to see what it looks like.”

I knew Jack’s kind heart too well to fear for the cow.

CHAPTER XI.

THE EAR.



NOTHING of especial interest happened before the next Friday, when we were to talk about the ear.

We sat down outdoors, and, without waiting, Jack said,—

“I suppose this is another end organ. I don’t see the use of talking about it, anyway. We can see the whole thing, and if I just pull and pinch Florence’s ear enough I can find out all about it.”

He began to pull and pinch, “just to show us how,” he said.

“Oh!” squealed Florence. “You’ve let me know that I have nerves there, anyway. Pull your own ear.”

I told Jack he might be teacher, and tell us all he knew, but he begged to be excused.

"The ear," I said, "is an end organ. It has three parts. Do you know what they are, Jack?"

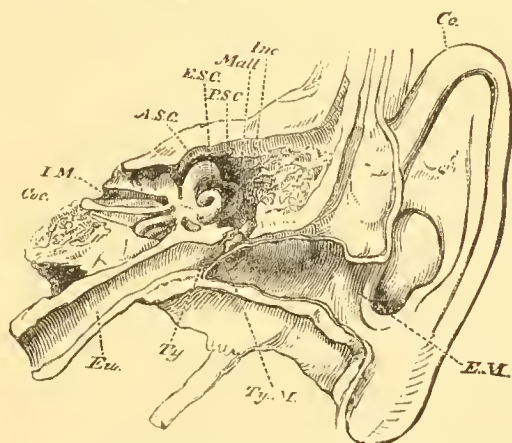
He felt of his ear and answered, "A hole; a round wiggle, and a flap to keep the dust out."

I asked Arthur if that was right. He "guessed not." "I think there is something inside," he said.

"Yes. There is the outside ear that we can see, the middle ear, and another beyond."

"Just what I told you, Arthur," Jack said; "but, mother, what is the use of the outside flap. I can see that the hole might be good to let the sounds in, but I should think that was enough."

"The flap, as you are pleased to call it, my son, is what persons not so wise as you call the outside ear. This collects the sounds, so that a greater

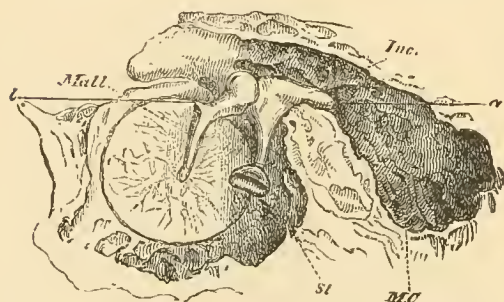


INTERIOR PARTS OF THE EAR: *Co.*, OUTSIDE PART OF THE EAR; *Ty.M.*, THE DRUM; *Mall.*, THE HAMMER-SHAPED BONE; *Inc.*, THE ANVIL-SHAPED BONE; *LM.*, THE SPACE FOR THE AUDITORY NERVE.

number of them can go into the hole. The hole is an opening into a crooked hollow tube that leads into the middle ear."

"Doesn't that tube lead to the drum of the ear?" asked Florence.

"Yes," I answered. "The drum of the ear is the



DRUM OF THE EAR AND SMALL BONES: *St*, THE STIRRUP-SHAPED BONE; *Inc.*, THE ANVIL-SHAPED BONE; *Mall.*, THE HAMMER-SHAPED BONE.

middle ear. A membrane is stretched across the end of the tube. This membrane separates the tube from the middle ear."

"And where does the wax come from?" continued Arthur.

"Some little sacs or glands that are placed in the tube are making it all the time. It keeps the membrane inside the tube soft."

"What is behind that membrane?" Florence asked.

"A hollow place, with a chain of three funny-shaped bones in it. The first of these bones is

shaped like a hammer, the second like an anvil, and the third like a stirrup."

"They must be tiny bits of things," said Hattie.

"Yes; they are very small. They are separated from the inner ear by a wall made partly of bone and partly of membrane."

"What is the inner ear?" asked Jack.

"It is a queer-shaped sac made of membrane. It is called the labyrinth. One part of it is shaped like a shell. Things are so mixed up in there that I cannot possibly make you understand about it. Liquid lies all around this membrane."

"What's that for?" said Jack.

"It helps to make the sounds pass."

"How do we know that we hear?" Florence said.

"By a nerve that comes from the brain. This nerve spreads out in the labyrinth all among those queer-shaped sacs."

"Just how do we hear?" asked Hattie.

"In the first place, a wave of sound goes in through the hole, and presses against the membrane

that covers the drum. This membrane moves the little bones inside the drum. These bones carry the sound wave to the membrane between the drum and the labyrinth. When the sound wave reaches the labyrinth it sets the auditory nerve in motion. In that way the vibrations made by the things we hear are carried to the brain."

They all seemed to understand it, and Jack said that "the ear was a bigger thing than he thought it was."

"Animals have big flaps to their ears, don't they?" said Arthur.

"Yes; and you know that some animals have much more power to hear than we have."

"How do people get deaf?" asked Hattie.

"In different ways; either the auditory nerve inside the labyrinth is injured, or something may prevent sounds from passing so as to reach the nerve."

But lunch was called, so we went in.

CHAPTER XII.

TOUCH, TASTE AND SMELL.



WE sat down on the twentieth of August to our last lesson. The children felt sorry that we were through.

"Do we know it all, mamma?"

Florence asked.

"No, indeed; you know only a very few of the wonders of your body," I answered.

"Why can't we learn more?" she continued.

"Wait till you are older. Then you can."

"School begins week after next, doesn't it?" said Jack. "Plague take it!"

"Yes; and I want you to have a little vacation before that time."

"Well, what do we learn about this morning?" he continued.

"I want you to learn a few things about smelling, hearing, and touch."

"We smell in our noses, don't we?" said Jack.

"Yes. What is your nose?"

"This thing;" and he gave to the little mountain on Hattie's face, usually called her nose, a pull.

"That is not Hattie's nose," I said. "It is only the covering of her nose."

"Where and what is her nose?" asked Arthur.

"The most of it is a hole in the bones of her face."

"That's funny," said Arthur.

"Yes. In the middle of the bone-man's face there is a hole, do you remember?"

They remembered.

"That is the place where the nerve of smell is set in motion by things from outside. The hole is divided into two parts by the bone in your nose that you feel."

"What are the holes in the covering of the nose for?" asked Hattie.

"They open into the air in front, and there is another hole opening into the throat behind."

"Then the nose isn't just to smell with?" said Jack.

"No."

"Do the nerves just spread out into nothing?" asked Jack again.

"O, no! There is membrane there for them to spread out into."

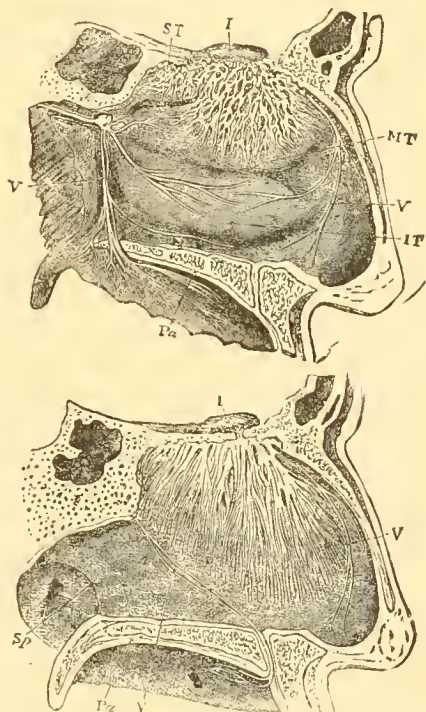
"Didn't you say in one of our first lessons that the part of our nose that we can move is cartilage?" said Arthur.

"Yes."

"Well, I sha'n't call this my nose any more. I shall call it my covering," said Jack.

"I don't think I would," I answered; "people not so learned as you would not understand you, I think."

"All right," he said. "Where do I taste?"



SECTION OF THE NOSE AND PARTS CLOSE TO IT:
I, THE "NERVE OF SMELL," AND ITS BRANCHES.

"On the back part of the tongue. The nerves that come from the brain spread out there."

"Don't we taste anywhere else?" Hattie asked. "It seems as if I could taste on other parts of my tongue."

"You cannot. The soft palate helps a little, though."

"Is the taste-nerve in the muscle of the tongue?" Arthur asked.

"No; it is in the membrane that covers the muscle."

"Can't we touch with the tongue? It seems as if we could," said Florence.

"Yes; the tip of the tongue can feel as distinctly as any part of the body."

"Do we touch with anything except our fingers?" asked Hattie.

"Think."

"Of course we do," said Jack. "We can touch everywhere, can't we?"

"Yes. I told you something about touch in one of our first lessons. Do you remember?"

"Oh! I do," said Arthur. "The feeling is in the second skin."

"That is right. The nerves form little branches or loops in the second skin. These are the end organs of the nerves."

"The nose and tongue are end organs, are they not?" said Jack.

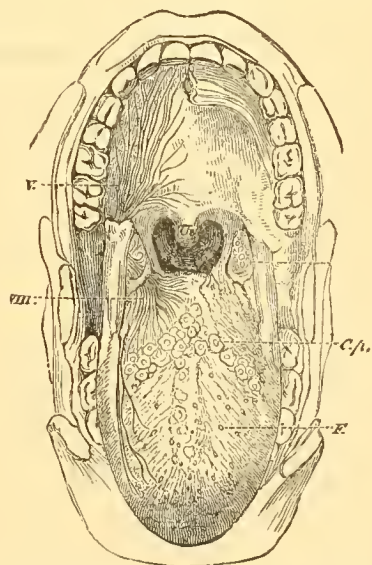
"Yes."

"The more I think about the nerves the more strange they seem," said Arthur.

"Yes," I said, "but they are not much more strange than the rest of the body. They would be helpless without the rest."

"That's true," he said.

"But now, my dears, we are through, and let me tell you one thing that is more important than anything else: remember to take care of your



THE MOUTH WIDELY OPENED TO SHOW THE TONGUE AND PALATE: ON THE RIGHT SIDE OF THE TONGUE—THE TONGUE IS PARTIALLY CUT AWAY SO AS TO SHOW THE FIBRES OF THE "TASTE NERVES" WHICH END AT THE SPOTS *C-p* AND *F*.

bodies. I want you to grow up to be useful men and women. It is not now while you are children that you will suffer because you abuse your bodies. It is when you grow older. The parts will be worn out trying to do work that was too hard for them to do, and you will die or be sick and worthless."

We had been sitting in a little arbor formed by a few trees that grew by the side of the lake. The sun was making little sparkles on the water. A light wind was moving the branches and the birds were singing above us.

"Promise me," I said, "that you will not forget what I have told you this morning. It shall be my reward for the work I have done for you."

They promised, one by one, and they have not forgotten. Strong minds and strong bodies are the result of their care.







